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OUR NORTHERN FRONTIER.

"In times of Peace prepare for War."

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I. WHAT PROVISIONS SHOULD BE MADE FOR THE PROTECTION
OF OUR NATIONAL INTERESTS ON THE GREAT LAKES IN
VIEW OF EXISTING TREATY STIPULATIONS?

OUR northern frontier when considered from a military stand-point presents several marked features, the most prominent of which are those connected with the Great Lakes. A casual inspection of the map at once reveals the fact that in the event of a war between the United States and Great Britain, whichever belligerent holds the command of these lakes will possess an advantage over the other of predominating importance.

The frontier of the power on our north, of which this chain of lakes forms the most important part, is one of very great extent. With respect to our front its right rests upon the Pacific Ocean, and can be turned by the Pacific States and Territories. The left flank rests upon the Atlantic, with the St. Lawrence River and the Great Lakes leading into the heart of the country along the line of the frontier. The rear is protected by the inaccessible Arctic Ocean. The centre of the line may be con-

sidered as a double one, if such a term be permissible; one point at which it may be attacked being west of the Great Lakes, to cut the railway system there and to shut off the great wheat producing region; and the other point further east, the objective point being the provinces of Canada proper. Reciprocally the flanks and centre of the United States are similarly exposed, especially the flanks, to operations from the sea,—England's great national base of operations; while there exists the further danger of exposure to direct attack by sea from the British West Indies.

Owing to the length and character of the Dominion frontier, coupled with the distribution of the population, it will be impossible for the English to defend it throughout its whole length. Their principal defense will be confined to the older provinces of Canada proper, which present a long strip of communications, its main artery, the St. Lawrence River, being the fosse of a natural fortress, open during the summer season (winter operations for a large army may be deemed impracticable in that climate) to the navy of England, and to her alone so long as the fortress of Quebec is kept in a defensive condition.

West of the river proper, the command of this great moat, and the vast advantage which its possession insures, will depend upon the ability of Great Britain to secure and maintain possession of one or more of the Great Lakes.

Once the control of even lakes Ontario and Erie is secured to the vessels of the English navy, it will require no labored argument to impress upon any mind, however ordinary, the stupendous advantages at the disposal of the enemy, not merely for defensive, but for offensive purposes also,

If there is even a reasonable possibility that England may, in the event of war, secure, for however short a time, such control, it is only too evident that it is the imperative duty of this Government to take all needful measures to prevent so dire a calamity and to secure from capture and destruction the vast interests of the United States upon these lakes and upon their shores. In the endeavor to secure this great end, the Government is greatly handicapped by a specimen of the astute statesmanship of our past history, designed no doubt to exclude the English navy from the Great Lakes; the practical result being that to-day these lakes in the event of war are free to a large contingent of that navy, and not to our own.

TREATY OF 1817. Arrangement between the United States and Great Britain, made by Richard Rush, Esq., acting as Secretary of the Department of State, and Charles Bagot, His Britannic Majesty's Envoy Extraordinary, etc., concluded April 28, 1817.

The naval force to be maintained upon the American Lakes by his Majesty and the Government of the United States shall henceforth be confined to the following vessels on each side; that is—

On Lake Ontario, to one vessel not exceeding one hundred tons burden, and armed with one eighteen-pounder cannon.

On the upper lakes, to two vessels, not exceeding like burden each, and armed with like force.

On the waters of Lake Champlain, to one vessel not exceeding like burden, and armed with like force.

All other armed vessels on these lakes shall be forthwith dismantled, and no other vessels of war shall then be built or armed.

If either party should hereafter be desirous of annulling this stipulation, and should give notice to that effect to the other party, it shall cease to be binding after the expiration of six months from the date of such notice.

The naval forces so to be limited shall be restricted to such services as will, in no respect, interfere with the proper duties of the armed vessels of the other party.

After reading the provisions of this unique treaty, it is not at once apparent "what provision should be made for the protection of our national interests on the Great Lakes." We dare not "give notice," for that might mean war, for which we are utterly unprepared, and if we were to attempt to get ready for one, England might wait only long enough to send over her fleets and then proclaim the declaration of war with a blow.

This Government having, as its statesmen supposed, evaded the necessity of maintaining a proper defense upon these lakes, rested.

England, on the contrary, has had the foresight and military sagacity to build systems of canals which enable her to float her naval vessels from deep water on the St. Lawrence to the upper Lakes, the ostensible purpose of these great works being the assistance and development of commerce.

What the national interests are in and along the Great Lakes it is not necessary here to point out, they are known to all the world. The entire limit to which this paper is restricted would suffice to convey but a faint idea of the vast commercial, material and political interests which are here at stake, exceeding in value and importance those of the whole United States of but a few years ago. It might be a reasonable supposition that due precautions have been taken for the protection and assurance

against loss or destruction by a possible enemy, of these great interests.

Yet it is a fact that the United States, having secured this great treaty of 1817, appear to have reached the conclusion that safety and security are assured, and nothing further is necessary.

In the past time of our history, there appears to have been an idea prevalent that some means of defense, even for the relatively small interests then at stake, were an absolute necessity, and a very comprehensive and perfect system of defense for that day was designed, and about the years 1839-43, such works as Fort Ontario, Niagara, Porter, Wayne, Brady, etc., were *commenced*. These works have never been completed, have no armament, and, in the language of the annual reports of the Chief of Engineers for the past few decades, are even "much in need of repairs."

The means for the defense of our "national interests on the Great Lakes," are simply grotesque, a travesty upon a modern system of defense too absurd to merit contempt, however good it may have been in the past. Behind this system stands the Regular Army, a body of nearly twenty-five thousand men. Also, as a reserve, a so-called Militia, aggregating 91,290 men, much of it existing "on paper" only, poorly armed, and in case of a sudden war without the power of speedily getting a better equipment; without a proper organization and, being purely a militia of the individual States as such, of no practical value for national defense: a fact demonstrated in every war from that which secured the independence of the country to the present time. It is drawn from a force of over eight millions of able bodied men who may be called upon for the defense of these interests; a mob, without organization, discipline, officers, or arms, and without the power of obtaining these indispensable equipments of a soldier in case of a war with England, save by the slow process of manufacture at home, and this means that, whatever other advantages we may possess, we have not at our command, *time*, the mightiest factor in the drama of modern war.

In the event of war with England, if we have no well-digested system of defense ready for use, her war vessels will enter the Great Lakes, and without the necessity of landing can either destroy the property along the shores, or else lay the people and the cities under contribution. There would be no time for preparation to meet the assaults of such vessels. With a fleet, or

even a single vessel of this kind in front of a great city, it would be of no avail to collect troops to protect it. Nor to produce the torpedo boats which may have been sent on by rail. The slightest sign of an attack upon the enemy's vessel would cause her to open fire upon the doomed city. We have wonderful railway facilities, but what would it avail to concentrate 100,000 men within even twenty-four hours at the threatened point? They would be of no use against an armored ship. Suppose that in a night the men so concentrated would throw up earth-works and mount our old obsolete guns (if it were possible to handle guns of even their small size with the rapidity assumed), what injury could be done to the ship? It would take position out of their range and bombard the city in safety.

But it is idly claimed that we could mount guns as powerful, or even more powerful than those of the enemy. No doubt, if we had them and had the time! Possibly the citizens would approve the idea of having such batteries constructed along their lake front, where every shot which missed a battery would hit the city to a dead certainty! And if the batteries are not constructed there, the vessels would again be out of range, and at liberty to give undivided attention to the city. The lake front of a city cannot be strewn with torpedoes, and if it could be they would be of no avail unless protected by guns ashore. A single vessel can lay under contribution any of the lake cities before which she may come, and the rather unruly population of any of these cities, rather than have their homes bombarded by an enemy, would much prefer hanging to the lamp-posts any bankers or other capitalists who might demur at having to advance the money required to prevent it. The shipping would have to be destroyed, or the enemy would tow it over to Canada as a prize. As there is a goodly amount of it, it is but natural to expect that the British tars will not be slow in getting at it.

That the "national interests upon the Great Lakes" are utterly defenseless in case of sudden war with England, and at present equally incapable of being defended in the event of such a war, is patent to all men.

When the gravity of this state of affairs is seriously considered, the indifference of the public to this grave subject is a matter of amazement. This cannot result from want of information, for the subject has been presented by the proper authorities again and again; it cannot result from any inherent difficulty in the

subject, for it is one devoid of professional technicality, so simple that the commonest mind may comprehend it; nor can it be because it is without interest, for it is of vital interest to the nation. But it would seem that what concerns the body corporate, is everybody's business, and as such is outside of individual concerns, with which "the people are so wrapped up that public affairs are put out of sight," and instead of any attempt being made to remedy the evil, it would seem that "the people prefer to erect a great counter along the whole lake front, behind which they stand in expectation of the Almighty Dollar like so many linen-drapers."

We are content to live on in a fool's paradise, from which we may one day be rudely awakened to a realization of our utter defenseless condition, and absence of preparation for any war, however trivial.

We are constantly reminded that we do not need much preparation beforehand, for we have "the men and the money," the best railway system in the world, all military resources without limit; can concentrate any number of men at a threatened point at pleasure, together with other advantages almost without limit. Admitted all this. To what military end would a million of men contribute, assembled without arms, organization, administration, or anything adequate to transform them rapidly from what they would practically be under such circumstances—a mob, into an army? Which party would the railways most aid, the invader or the defender? Of what avail all the undeveloped military resources imaginable, when time and money, costly machinery and practical skill, are prime requisites to their conversion into available military resources? A year or two to convert the men into soldiers and armies; a year or two to convert the iron into modern steel guns; a year or two to commence building a navy; a year or two with a steadfast determination to accomplish the ends in view, and we might indeed make some adequate preparation for war. But how are we to command this indispensable element of time? Modern wars are begun and ended in half this time. "Ninety-day" gun boats can again be built, but they would now have to meet a thoroughly prepared enemy, and would be of no avail, for though it might be possible to build the boat, it is not possible to build a modern high power gun in "ninety days."

The power of rapid and sudden concentration upon any given point is so certain in these days of large and rapid steamships,

that the appearance of armies at our doors would be almost simultaneous with the declaration of war, and no nation of the world possesses this power to such a vast extent as England. That there is danger to this country in such a state of our defenses as now exists, no man can reasonably doubt. Our wealth has increased to such marvellous proportions as to become a temptation to any powerful and warlike nation, possessing a large and costly armament, with little or no employment for it at hand.

Peace, so ardently desired by the industrious millions, seems to be as precious as it was at the dawn of man's recorded history, but that history in every part reveals the fact that war is a universal element of nature, and especially of human nature, and that no nation or society can justly or safely deal with the affairs of this world which does not recognize this fact, and take due precautions accordingly. To prevent danger from war and thus provide the greatest security, costs money, much money, liberally and judiciously employed and expended ; in fact, that we should carry a reasonable policy of national insurance.

It is a matter of constant wonder that a nation composed of as able and shrewd business people as can be found in the world, is content to neglect so utterly a matter so important as a proper and adequate system of national preparation for defense. Individually we pride ourselves—and with reason—on the prudence with which we conduct business matters. We scrutinize with care our position in its every relation ; make ample preparations to meet every liability, and add to our reserves as these liabilities extend ;—contenting ourselves with reasonable profits that we may be able to insure against the loss of the machinery, or of the vessels, or the destruction of the roads or other means by which our business is carried to market or conducted, and yet we cannot as readily determine to conduct the affairs of a great nation in this same plain, business way, and pay the paltry insurance that will suffice to keep our house in safety and our goods and our lives in peace.

The fact that the national interests on the Great Lakes are utterly defenseless being patent to all men the provision which should be made for their protection is equally evident. It is simply for the nation to appropriate the necessary funds, and to order the proper officers to go to work at once to remedy the defect. That they have not the ability so to do if furnished with the necessary means, no one has undertaken to assert. In fact it is hardly a

question of professional ability at all. The application of the same means which has placed the supremacy on these lakes within the power of England, will restore it to us. If she has built a canal with locks 250 feet long and 14 feet over the mitre sill, enabling her to place a certain class of vessels upon these lakes—which vessels she has also of course taken the precaution to provide; we can, and must, build a canal with longer locks and more water, and provide a fleet of vessels ready for service, which shall be able to meet and destroy any that England can bring into these lakes. If necessary locks 300 feet long, with 15 feet of water on the mitre sills.

Wholly aside from the absolute strategical necessity for such a canal or system of canals, will be their inestimable commercial value to the nation, which alone will repay their cost many times. If it is found, as will most likely be the case, that the railway companies are hostile to such measures, and endeavor to prevent their speedy accomplishment, they should be held to be, and treated as, the worst enemies of the country.

Although a canal system is the paramount requisite to the proper defense of our lake interests, others of minor importance are of more pressing necessity, and should be provided with the least possible delay. What they are, can probably be best indicated by the official report to Congress by the Fortification Board.

(4) *The Lake Posts.*—The situation being peculiar, an explanation becomes necessary.

The treaty of 1817, between the United States and England limited each party to an insignificant naval force upon the Lakes. At that time the country on both sides was undeveloped; with the exception of Detroit there was nothing perhaps deserving the name of town upon the upper Lakes. Everything has changed; large cities as centres of commerce now dot the coast of the lakes, and the wealth and property liable to capture and destruction are enormous in amount.

In the meanwhile our neighbors over the line have surmounted the rapids of the Saint Lawrence and the Falls of Niagara by canals which, in their present condition, permit the passage of boats of 9 feet draught, and when the improvements shall have been finished will have a draught of 14 feet. The present draught will admit many gunboats now in the possession of Great Britain, and when the depth of water is increased, armored vessels from the other side of the Atlantic may float in the waters of Lake Erie. A state of war, therefore, with that power, would at this time, unless something be done to avert the consequence, involve the lake cities in frightful losses or even destruction. These cities, being upon the shore, could not by land forts be protected from bombardment. Fort Wayne, on the Detroit River, if supplied with suitable armament well placed, could, with the assistance of submarine mines and torpedoes, prohibit a passage into Lake Huron. The canal at the Sault Ste. Marie would also demand a fort to protect it from destruction.

Our commerce on the Upper Lakes is much more extensive than that of Canada, and doubtless many of the steamers might at a pinch be converted into light-armed naval vessels. But to do this, with any prospect of anticipating the arrival of British gunboats after the declaration of war, the vessels should be inspected, beginning now, and the inspection continued, so that a perfect knowledge might be obtained of the number and description of all that might be fit for the service designed, and plans of their modification to receive guns be made and kept, so that when the vessels are wanted there should be no unnecessary delay in preparing them for service. It is needless to state that the guns and other necessary material should also be provided, ready for use at a moment's warning.

Upon Lake Ontario the Canadian commerce is superior to ours. Some protection, however, would be needed here, which, imperfect as it is, might serve a good purpose. It is proposed to keep in one of the interior lakes of New York, vessels armed with light guns, and furnished with self-moving torpedoes, to be sent when needed, by canal into Lake Ontario.

Some might be sent to Buffalo for service in the Upper Lakes. A port of refuge against the superior naval force of England should be provided in the lower part of Lake Ontario.

The fort at Rouse's Point is sufficient, with the addition of a few 8-inch rifles, to secure Lake Champlain from an inroad. It may be observed that one or more fortifications on the St. Lawrence River would be required, which in the event of hostilities, could at once protect our frontier and command the water approaches to the Lakes. They would be more reliable than an improvised fleet upon Lake Erie, though they could not wholly take its place.

PROPOSED ARMAMENT.

Locality.	Calibre.	Kind.	No.	Remarks.
Fort Wayne.....	10-inch	27 ton guns.	3	Breech-loading Rifles.
	8-inch	13 " "	3	" "
	6-inch	5 " "	4	" "
	10-inch	Mortars.	8	Rifled.
Proposed Fort on St. Lawrence River....	12-inch	50 ton guns.	2	Breech-loading Rifles.
	10-inch	27 " "	6	" "
	10-inch	Mortars.	8	Rifled.
Fort Montgomery Rouse's Point	8-inch	13 ton guns.	4	Breech-loading Rifles.
	10-inch	Mortars.	8	Rifled.

The interior lake or other place where naval vessels are to be kept, must of course have quick and easy access to the water of the great lake, and it is hardly necessary to point out that a sufficient force must always be at hand to secure the place from any sudden descent and attack.

The forts upon the St. Lawrence can be so placed as to prevent vessels from passing, and also to bring the canals and locks under command of their guns, when they may readily be destroyed if necessary.

Other means are necessary for the proper protection of the lake interests, but as they pertain more particularly to another branch of this subject, they will be developed further on.

The money value of the destructible property within easy reach of the enemy, exceeds \$1,000,000,000. Any wise and competent business man having property at great risk thinks nothing of paying annually one, or one-and-a-half per cent. as an annual premium for insurance against even partial loss. The premium in this case to be paid annually, would amount to ten or fifteen millions. One-half of the smaller sum if expended yearly by this Government for only a very few years would readily place the Great Lakes within our military control, and assure the protection and security of all our interests connected therewith, and at the same time, and what is really of far greater consequence, the chances of war occurring would be greatly reduced.

A nation is not so apt to be attacked when ready and capable of making a good fight.

Given the necessary authority, and a tithe of the enormous surplus of the national income, and our Navy and Army officers will soon perfect and develop all of the necessary means and "provisions for the protection of our national interests upon the Great Lakes" without losing from view the provision of the existing treaty, and also with strict adherence to any other reasonable stipulations. Without money, and plenty of it, nothing can be done or expected.

II. TOPOGRAPHY OF OUR GREAT LAKE CITIES.

The peculiar topographical features of these cities, to which attention is here sought to be called, exists in the fact of their utter indefensibility by any of the ordinary arts of the military engineer. A description of the location and topographical surroundings of one city, will be in effect the same for all others.

Take for instance the city of Chicago, built upon the margin of Lake Michigan, extending along the shore for eight miles, and back therefrom for six miles, with a population of over 500,000. An enemy's war-vessel finds any desired depth of water right up to the very shore, and could bring every foot of ground, and every house in the city, within range of its guns. There is absolutely no site whatever for defensive batteries, or for the emplacement of guns, except upon floating batteries, and these we are precluded from building by the terms of the treaty of 1817.

It would be worse than useless, as has heretofore been pointed out, to mount guns along the lake front of the city ; a measure not to be considered for a moment. To place batteries off on the flanks of the city would be as useless as to erect them in the heart of the continent. To attempt to place a system of torpedoes in the deep waters of the lake, for the purpose of keeping an enemy's vessels out of range of the city, is impracticable ; and if it were not, the system would be valueless, unless strongly defended by land forts and batteries, or a sufficient naval force of gunboats or other naval vessels. Small torpedo boats can readily be sent by rail to Chicago, but they are of little value unless accompanied by regular war-ships, and in any event they will be met by a stronger force of more powerful boats of like character, than can possibly be transported by rail.

Great reliance has been placed upon the value of movable torpedoes for defensive purposes, but recent experiments in England, against the old *Resistance*, a worn-out and condemned ship of the navy, by Whitehead torpedoes sixteen feet long and charged with ninety-three pounds of gun cotton, demonstrated the fact that the regulation wire torpedo-netting stopped the torpedo in every instance, and though torn at the point of contact was not greatly injured by the explosion.

As regards the ship, the experiment proved that, with the netting at a distance of twenty-five feet from the hull, the explosion of the torpedo was perfectly harmless. At a distance of twenty feet some slight damage was done. At a distance of fifteen feet the explosion seriously damaged and displaced some of the armor plates, causing considerable leakage, but not enough to cripple the ship, much less sink her. It was considered certain that a vessel protected by netting placed twenty-five feet from the hull is absolutely safe from attack by this class of torpedoes. But it was determined in these experiments to ascertain the maximum effects to be expected from such torpedoes. Accordingly one was attached longitudinally amidships, just above the bilge-keel of the old and already shaken hulk ; and in that position it was exploded. Of course it was expected that the vessel would be blown into the air. But nothing of the kind occurred. The old *Resistance* proved worthy of her name. She was seen to sway a little, and on examination it was found that the bilge-keel was broken to an extent of twenty feet, and that several holes had been made in the hull. But only one of her

compartments was filled with water, nothing happened to prevent the working of her guns, and she was in condition to be brought into the harbor for repairs.

It is true that this vessel is much larger than any which can be brought into the lakes, but it is also true that she is one of the old type, a worn-out and condemned hulk, and not so strong, nor so capable of resisting such attacks as smaller vessels of more recent construction.

These experiments go far to confirm the opinions of many able naval authorities that the popular idea of the destructive effects of torpedoes is highly exaggerated, and that the torpedo-netting as now perfected is a certain means of defense against them.

But, as has already been stated, it is here useless to attempt any of the ordinary means that may be devised for the defense of a city or place, when once the enemy brings the city under command of his guns. Unconditional surrender and submission to his will is then inevitable, or the penalty will be destruction. How sudden and complete such destruction may be accomplished is evinced by the results of the great fire in this very city of Chicago in 1871, where every effort could not prevent the destruction of property to the value of \$196,000,000 in a few hours. It may be idly hoped by some that an enemy would not resort to such extreme measures. He probably would not do so, provided always that the city surrendered at discretion, and strictly complied with his orders. Otherwise he would destroy the place to a certainty, and there is nothing in the history of war, even as practised by ourselves, to lead any one to expect other results.

Our own practice during our late War, of holding that all railway property is a great military resource, a resource upon which we now predicate much of our supposed security, leads us to expect that all property of this character which cannot be carried off will to a certainty be destroyed. This is a fact which railway corporations and their attorneys might well bear in mind when opposing the construction and completion of a proper system of strategic canals. These corporations have a vast deal of property which would readily come within the destructive reach of an enemy, who would be sure to destroy it, and there would be no likelihood that the Government would ever reimburse them for the loss of such property in that way.

From whatever point we may consider the topography of the lake cities, with a view to remedying their utterly defenseless and apparently indefensible condition, and of securing from capture or destruction such a vast amount of property; we are ever brought face to face with the one great topographical feature so prominently connected with this whole subject, the Great Lakes themselves. It is perfectly evident that if the possession and command of these lakes be secured to our arms, the safety and protection of these cities, save from attack by land, is at once and completely assured; and it is equally evident that their possession by the enemy secures to him the ready capture of the cities beyond the possibility of a doubt, together with other military advantages and consequences the most grave and momentous. Further, the control of these lakes admits of no division. It must indeed be with us a question of all or nothing, and this Government must take measures, no matter what the cost may be, to render her military control of all of them absolutely certain. In this way, and in this way only, can the safety of these cities and the other great national interests connected with the Great Lakes be secured.

III. "NAVAL POWER OF GREAT BRITAIN."

The table found on pages 106-116 of the report of the Endicott Board, gives the characteristics of the principal vessels of the English navy. There is a large number of vessels not represented in this table, but which would no doubt be made available in the event of war. Among these may be mentioned over 400 of the fast iron and steel merchant steamers, the finest in the world, which are on the Admiralty list. Not only this, but what is of far greater moment, they have at hand all of the guns and other necessary material requisite for readily and speedily converting these vessels into war-ships of great value and high speed. From the table referred to it would appear that there are 226 vessels with 1470 heavy guns of from 5 inch to 16.25 inch calibre, with crews aggregating 40,242 men. They carry, besides, a large number of quick-fire and machine guns, and 42 second-class torpedo boats. How many torpedo boats there are in the English navy does not appear, but they already number several hundreds, and large additions are constantly being made. The naval fleet of England, then, if deemed necessary, will aggregate over 600 vessels.

Although our coast line is one of great extent, yet in the present state of our preparation this fleet could capture or destroy any or all points upon the coast deemed of sufficient importance. Even were our land defenses complete, this fleet is yet capable of maintaining an efficient blockade of all our important harbors and seaports where ships may be constructed.

Great as is the extent of our own coast line, it remains a fact that the rivers, harbors and bays of any considerable maritime importance are comparatively few in number, viz.: the Penobscot and Kennebec rivers; the harbors of Portland, Portsmouth (N. H.), Boston and New Bedford; Narragansett Bay; the harbors of New London, New Haven and New York; Delaware River; Hampton Roads; the harbor of Beaufort, N. C.; Cape Fear River; the harbors of Charleston and Savannah; Cumberland Sound; the harbors of St. Augustine, Key West, Dry Tortugas, Pensacola and Mobile; Ship Island; the Mississippi River; the harbor of Galveston; the bays of San Diego and San Francisco; the Columbia River and Puget Sound. A total of 29 points of first importance to be closed by the enemy's fleet, and which when closed would practically bring the foreign trade and commerce of this country to a stand-still.

The would-be wise call attention to the fact that England also possesses a vast mercantile marine, which is in danger from our *privateers*. These people are yet living in the days of 1812-15. The less said about privateers the better. These must now be fast steamers, and where have we one that can compete with the hundreds possessed by England? How long would it take us to build such vessels, even if every one of our ship-yards were not already in the hands of the enemy? Suppose we had the vessels, they would be watched and pursued by the enemy, and where are our coaling stations all over the world to enable us to keep the seas? England alone has these fast steamers, has the men to man them, and the guns and material at hand to arm and equip them, and is under no obligation not to use them against us; and she has the necessary coaling stations in every quarter of the globe. She would sweep the last ton of our shipping from every sea before we could raise a hammer to construct the privateers which these visionaries count upon to do her so great damage.

In the present state of our defenses England can capture every ship-yard in the country. Even when we are secure against

this danger, the privateers upon which such great store is set, if without the assistance of a powerful navy, would have to evade a powerful blockade and escape to sea in the face of the swiftest vessels that now sail the seas. If successful in escaping they would then be dependent upon a precarious coal supply.

Thanks to England's present position upon the ocean, her naval officers and merchant sailors now believe as much in privateers as did those of our country in past times. Being now in position to profit by this kind of warfare, she will no doubt adopt it. When of old time her sailors indulged in this species of genteel piracy, they left no lessons to be improved upon by the best Yankee who ever sailed a ship.

It is common for the people of this country to limit all considerations of danger from England's naval power to the ocean seaboard, but a short study of the publication of the Naval Intelligence Bureau, entitled "Notes on the English Navy," shows us that this Power has fifty-seven war vessels drawing less than 12 feet of water and over 9 feet; ten drawing between 7 and 9 feet; and forty-four drawing less than 7 feet; a total of 111 vessels; three of which are armored, and all of which are available for service upon the Great Lakes.

IV.—RELATIVE FACILITIES FOR OBTAINING AND MAINTAINING SUPREMACY ON THE LAKES IN THE EVENT OF WAR.

These comprise in general the lake mercantile marines of Canada and the United States, and their availability for war purposes; railways as a means of transporting torpedo boats and other naval or war material; and, most important of all, the canal systems of the two countries, and their relative capacities to float war vessels from the ocean to the lakes. Also, in connection with any or all of these, the relative powers of the two countries to destroy, or prevent their use for such purposes.

Of the canal system of the United States, the Erie Canal and its connections is the only one of much present value for the purposes indicated. The limited size of its locks and depth of water over the mitre sills, render it incapable of furnishing the means of conveying to the waters of the lakes any war vessels save those of the smallest size and power. But even of these we have none. The locks are only 110 feet in length, 18 feet wide, with 7 feet of water over the mitre sills, permitting the passage of boats $98 \times 17\frac{1}{2} \times 6\frac{1}{2}$ feet, or of 225 tons.

The canals of Canada are among her most important public works, their estimated cost being over \$60,000,000. Ships of 4500 tons burden can enter the harbor of Montreal by a canal unsurpassed by any other canal works, excepting those on the Clyde; and from thence, propellers of 1500 tons can proceed to the head of Lake Superior. The exact nature and extent of the system of canals constructed for the navigation of the St. Lawrence River, and the chain of lakes, is given in the appendix to the annual report of the Canadian minister of railways and canals for the fiscal year July, 1883, to June 30, 1884. All permanent works of this system, such as locks, bridges, sidewalks, etc., have been built with a view of having a depth of 14 feet over the mitre sills. At present all of them have ample depths for vessels of 9 feet draught, some of them for 12 feet, and the improvements upon all for this depth will soon be completed.

The Welland Canal, connecting lakes Ontario and Erie, will soon admit vessels 250 feet long, 38 feet beam, 22 feet depth of hold, and 14 feet draught.

The canals of the St. Lawrence system above Montreal are the Lachine, the Beauharnois (the only one on the south side of the river), the Cornwall, and the Williamsburg, the last named including Farran's Point, Rapide Plat, and Galop's canals. This system necessitates the navigation of the river along the borders of the State of New York, and can readily be destroyed or rendered temporarily useless by properly situated and equipped forts upon the south bank of the river. (It is hardly necessary to say that the United States Government has not taken any practical steps towards the construction of such forts.)

This fact necessitated the building of another system, entirely beyond the reach of hostile demonstrations—the Montreal, Ottawa and Kingston route. This extends from the harbor of Montreal, passing through the Lachine Canal, the navigable sections of the Lower Ottawa, thence by the Rideau River and Rideau Canal to Kingston and Lake Ontario. Total distance, $245\frac{1}{2}$ miles. The system is closed by ice from about the last of November to about the 1st of May. The depth of water contemplated upon the entire completion of the system is 9 feet over the mitre sills, the locks being $200 \times 45 \times 9$ feet.

The Trent River navigation presents features of great strategic importance, though of but little present practical value. It is more than probable that the date at which the United States

commence the construction of proper works upon the banks of the St. Lawrence, will see the inauguration of the work necessary for the speedy completion of this system of navigation, thus flanking our efforts upon that river as well as upon the St. Clair, and giving the Canadians access into lakes Huron and Michigan, as well as into lakes Ontario and Erie. This system consists of a series of water stretches from the mouth of the Trent on the Bay of Quinté, on Lake Ontario, to Lake Huron. It is not now a connected system of navigation, and in its present condition is only efficient for local use. The route is from Trent River through Rice Lake, Otonabee River, and lakes Clear, Buckhorn, Chemong, Pigeon, Sturgeon, and Cameo, to Lake Balsam, the summit, 166 miles from Trenton; from Lake Balsam by a canal and Talbot River to Lake Simcoe; thence by the Severn River to Georgian Bay, Lake Huron, 235 miles. The execution of this scheme, commenced in 1837, was subsequently deferred, but certain works have been done establishing communication with the town of Lindsay and through Lake Scugog to Point Peney, 190 miles from Toronto; 155 miles of this distance being navigable for light draught vessels. In connection with this scheme the Murray Canal is being constructed across the Murray Isthmus, to connect the headwaters of the Bay of Quinté and Lake Ontario. This cut is $4\frac{1}{2}$ miles long, and the canal will have a draught of 11 feet below the lowest known water-level of the lake, and a width at bottom of 80 feet. There are no locks.

There is, however, another system of navigation proposed, of vastly greater strategic value than any of these, viz.: that by way of the Ottawa and French rivers to Lake Huron. Such a canal would, in a military sense, be the most important in Canada, and its speedy completion would probably be contemporaneous with the works undertaken by the United States Government along the St. Lawrence and elsewhere. This line perfectly fulfills the essential condition of being removed from the frontier and the immediate reach of the enemy. There is hardly a military requisite for its easy defense that it does not fulfill. If this communication were opened, so long as England maintains her supremacy on the ocean (and when she loses that she will no longer be England), her gunboats could be as freely placed upon these lakes as now on the St. Lawrence at Quebec. This canal is of vastly more importance to the Dominion of Canada, in a

military point of view, than any other can possibly be, and would be of equally great commercial value. It is the best work of defense that can be constructed in Canada, and is already complete to Ottawa.

The remaining system of navigation to be considered, with reference to strategic lines of communication, is that of the Richelieu River and Lake Champlain. It commences at Sorel, at the confluence of the St. Lawrence and Richelieu rivers, 46 miles below Montreal, and extends along the latter river through the St. Ours lock to the Chamby basin, thence by the Chamby Canal to St. Johns, and the Richelieu River to Lake Champlain, a distance of 81 miles, with a depth of 7 feet on the mitre sills.

These complete the inland water lines of communication possessed by the Dominion of Canada, which, in the event of war, can be used to facilitate the concentration of a powerful naval force to operate at places along the frontiers of New York, Pennsylvania and Ohio; for it is assumed that we can block the passage through the Detroit River, if not by fortifications, at least by sinking barges or other vessels in the canal through the St. Clair flats.

A list of the vessels of the English navy available for service upon the lakes, has already been referred to, and it may as well be noted here that in a short time, this list will be greatly increased in numbers, and vastly in power, by the addition of a fourth class with less than 14 and over 12 feet draught. This class will add to the list 35 vessels, 4126 men, and 285 heavy guns, besides machine and quick-fire guns.

What use could be made of the mercantile marine in the event of war, seems to be a question for naval experts. On Lake Ontario that of Canada preponderates and all the best harbors are on her coast.

From the United States census for 1880 there appears to have been at that time upon the northern lakes and their tributary waters (excluding Lake Champlain) 947 steamers of all classes, measuring 222,290 tons, and giving employment to 9143 men. During the year 1880 these steamers carried 1,356,010 passengers, and 4,368,171 tons of freight, not including lumber. The military student can better deal with this tonnage as a means of transportation for an army and its supplies than as a war resource in a naval sense, the development of which pertains to that department of the Government.

For purposes of transportation a French writer has declared the following rule: "For each man (including subsistence), one register ton; for each horse (including forage), 3 register tons; for each two-wheeled wagon, 5 register tons; for each four-wheeled wagon, 10 register tons; for each bridge wagon, 15 register tons." The transportation of an army corps of 36,964 men, 8071 horses, 739 two-wheeled wagons and 671 four-wheeled wagons, requires 71,582 register tons of shipping.

The Canadian sea-going vessels of all kinds are capable of transporting ten such army corps. The facilities for getting the vessels ready for war purposes would appear about equal. But when ready we have no modern guns with which to arm ours, while the Canadians will have at their command all of the vast resources of England in marine warlike stores, guns, carriages and equipments of all kinds. With a secure base in the strong and well-fortified harbor of Kingston from which to operate, and with the power of England to aid her, Canada possesses immeasurably greater "facilities for obtaining and maintaining supremacy in the event of war," at least upon lakes Ontario and Erie, than any at present, or soon likely to be, within the power of the United States.

The possession of such facilities by Canada will, however, avail nothing, unless she also possesses the power of defending them. She must have at her command a force strong enough for the defense of the St. Lawrence system of canals and the Welland Canal for a sufficient time to enable the English gunboats to pass through them, and also, if possible, to secure possession of Detroit and the river, and thus gain access to the upper lakes.

This necessitates the consideration of the

MILITARY FORCES OF THE DOMINION OF CANADA.

Naval.—The naval forces comprise eight armed screw steamers, and two additional ones employed on coast service, but not armed, these and the navy of England.

The census report of 1881 gives the number of mariners as 46,394 men, while the shipping returns for 1877 give the number of men connected with the mercantile marine as 16,000, and of those employed in the fisheries as 53,000.

Military.—The consolidated Militia Act of 1883, 46 Victoria, Chapter II., vests the command-in-chief of all military forces in the Queen personally, or in the Governor as her representative.

Art. 4. The Militia shall consist of all the male inhabitants of Canada, of the age of eighteen years and upwards, and under sixty, not exempted or disqualified by law, and being British subjects by birth or naturalization ; but Her Majesty may require all the male inhabitants of the Dominion, capable of bearing arms, to serve in case of *Levée en Masse*.

Art. 5. The male population so liable to serve in the Militia shall be divided into four classes :

The first shall comprise those of the age of eighteen years and upwards, but under thirty years, who are unmarried, or widowers without children ;

The second class shall comprise those of the age of thirty years and upwards, but under forty-five years, who are unmarried or widowers without children ;

The third class shall comprise those of the age of eighteen years and upwards, but under forty-five years, who are married or widowers with children ;

The fourth class shall comprise those of the age of forty-five years and upwards, but under sixty years.

And the above shall be the order in which the male population shall be called upon to serve.

Art. 60. The Officer commanding any Military District or Division, or the Officer commanding any Corps of Active Militia, may, upon any sudden emergency of invasion or insurrection, or imminent danger of either, call out the whole or any part of the Militia within his command, until the pleasure of Her Majesty is known ; and the Militia so called out by the Commanding Officer shall immediately obey all such orders as he may give, and march to such place within or without the District or Division as he may direct.

Art. 61. Her Majesty may call out the Militia or any part thereof, for active service either within or without the Dominion, at any time, when it appears advisable so to do by reason of war, invasion or insurrection, or danger of any of them ; and the Militiamen, when so called out for actual service, shall continue to serve for at least one year from the date of their being called out for actual service, if required to do so, or for any longer period Her Majesty may appoint.

Art. 62. In time of war no man shall be required to serve in the field continuously for a longer period than one year ; but any man who volunteers to serve for the war or for any longer period than one year, shall be compelled to fulfill his engagement, and Her Majesty may in case of unavoidable necessity (of which necessity Her Majesty shall be the sole judge), call upon any Militiaman to continue to serve beyond his one year's service in the field, for any period not exceeding six months.

Art. 63. Whenever the Militia or any part, or Corps thereof, shall be called out for active service, the officers and men so called out shall be paid at such rates of daily pay as are paid to Officers, and men of the relative and corresponding grade in Her Majesty's service, or such other rates as may, for the time being, be fixed by the Governor in Council.

The sections of this act, numbering 100 in all, form a complete system of military law for the government of the militia in peace ; and in war bring it under the laws and regulations of the English army.

The Dominion is divided into 12 military districts, each under the command of a competent officer, who is provided with the necessary staff. These districts are subdivided into the regi-

mental and company districts, each having its commanding officer and staff, who must prepare yearly the muster rolls of all of the militia within their respective districts, with their proper classification, etc., retaining one copy and forwarding the other to higher authority. This law is based upon the well-known principles upon which the Germans have developed such startling success in the mobilization and recruitment of an army in time of war, viz.; the division of the country into geographical military districts; the localization of the different commands, with complete rolls of every available man in every company district, giving the exact status as to the class to which he belongs, etc.; and universal liability to military service in time of war.

In case of war the most important features of this act are embodied in articles 60 and 61, and the potency of the power therein given to the Sovereign, and her officers, down to the commander of a military district or division; "upon any sudden emergency of invasion or insurrection, or imminent danger of either, to call out the whole or any part of the Militia within his command;" cannot be overestimated. Article 61 gives the power to call out every able-bodied man in the Dominion available for military purposes, for active service "within or without the Dominion," and to hold him, in case of emergency, for not less than a year and a half.

Should disputes arise with this country during a period of "hard times" in the Dominion, the fact that England becomes the paymaster in time of war might greatly increase the danger of a rupture. This fact, coupled with the utterly defenseless condition of our cities, and of the vast mercantile marine which would easily fall a prize to England in case of sudden war in our present condition, might precipitate a disastrous war upon us at a moment's warning; for if any war comes for which we are not adequately prepared, it is as certain as fate that it will be at England's time and declaration, and not at our own.

The present military organization for the defense of the Dominion has been drawn up by accomplished officers of the English army, who have carefully studied the requirements of the situation and the measure of the military resources. It forms a complete framework upon which to build an army, complete in all of its parts; provided with all of the necessary administrative machinery to put it into working order in the short-

est time required by the character of the material. The fact that all of the officers and non-commissioned officers, who at present possess at least some military knowledge and experience, can be named by the military authorities without a moment's delay; and that complete rolls exist of the men who are to complete the organization; and that the power is given to order them out on the instant; are all of the greatest consequence.

What provisions have been made for a war organization of the military resources at command we do not know, but we are well enough acquainted with the organization of the English army, its traditions and the opinion of English officers, to be able to make a very shrewd guess as to what may be expected; especially when taken in connection with the strength of the first class of this militia, and with the character of the organization which we are certain to adopt in the event of war.

The official report of the Adjutant-General of the Dominion of Canada, for the year 1885-86, informs us that the active militia of the Dominion then consisted of 747 companies, batteries, or troops, containing 37,346 men. It also gives in detail the military districts, with the organizations assigned to each. Were these organizations filled to the full war strength of similar English organizations they would include a total of 118,075 men.

Military Aptitude of the Canadians.—The last census gives the total male population of the Dominion in April, 1881, as 2,188,854. The average yearly increase of the same during the previous decade was about two per cent. per annum, or a little more. Taking this as the rate of increase since 1881, the Canadian Militia in April, 1887, numbered 1,146,201 of all classes, with 830,592 men available for soldiers in war.

The military aptitude of the Canadian people, or their general fitness for admission into military service, cannot be ascertained from any available statistics; but it may reasonably be assumed to be about the same as that of the people of the Northern States of the Union in the War of the Rebellion. The age for military service with us was from 18 to 44 years, both inclusive, and the military aptitude of this class of men was calculated in the Provost Marshal-General's office to have been 760.3.* This rate applied to the last census returns of the

* In Europe the number used to express military aptitude denotes the number in the thousand of young men of twenty years of age who are found fit for the army;

United States (1880) would give 15.4 per cent. of the total population as available for war, or 7,768,811 men. The rates which have been assumed in computing the following tables give 18.8 per cent. of the total population as available; the increase being due to the fact that the limit of age for the Canadians is sixty instead of forty-five years.

In determining the available military force for service as soldiers, all of the mariners are deducted, and the military aptitude of the first three classes is taken as 760, and of the fourth class at 740.

Province.	1st Class.	2d Class.	3d Class.	4th Class.	Totals
Ontario.....	144,497	43,250	126,130	82,627	396,504
Quebec.....	86,492	27,764	91,086	52,015	257,357
New Brunswick.....	16,423	7,833	18,056	12,664	54,956
Nova Scotia.....	25,591	9,272	19,838	13,934	68,635
Manitoba.....	7,214	2,598	5,143	2,237	17,192
British Columbia.....	3,283	3,722	2,824	3,225	13,054
Prince Edward Island.....	7,895	2,443	5,863	3,982	20,183
Territories	916	500	909	386	2711
Totals.....	292,311	97,382	269,829	171,078	830,592
Mariners. ....	....	....	....	....	46,394
Grand Total	292,311	97,382	269,829	171,078	876,986

The numbers here given are not strictly accurate, for the census returns do not give the data necessary to determine the number in the first and second classes of "widowers without children," nor in the third class the number of "widowers with children." This, however, will cause but a very slight variation in the number given for these classes, while the total will not be affected at all. It may here be remarked that the Germans claim to have brought under arms during their last war, seven-eighths of their available men. Were the Canadians to accomplish a like result in war, they would be able to bring under arms in 1887, 726,768 soldiers, and 40,593 mariners, a total of and this expression generally has a value much less than that given above for the United States, for the reason that it simply shows the number per thousand who usually enter service, while with us it represents the actual number per thousand who are fit for service whether they enter or not; the military aptitude of the country being the rate of availability for military service as derived from all its male citizens within the military age.

767,361 men. But to do this will, of course, necessitate drawing from all of the different classes of the militia up to sixty years of age. The Germans counted as available only the men who were actually in the army, or who had received their military training so recently as not to have passed out of the different reserves; while the Canadians, like ourselves, must depend upon the availability of the entire body of citizens of military age and fit for duty, numbering 830,592 men for the army, and 46,394 mariners.

It is evident that the present organization of the Dominion Militia cannot properly utilize the force available in case of war. As heretofore stated, we do not know what shape this organization will take to secure such an end, but it will surely be such a one as will absorb the first class of young unmarried men for their first line. There is quite a large number of trained officers in her active militia, and in Great Britain there are over 7000 officers, a large number of whom would seek, and be given, commands in the Dominion forces in the event of war. There are in the Indian army nearly 7000 English officers; added to these, there yet remain in England many thousands of highly educated and competent officers of the volunteers and militia. When the militia is called into the service and pay of the Empire, the Queen will undoubtedly appoint all of the general officers and colonels, and very likely all of the lieutenant-colonels or battalion commanders, from among the highly trained and most competent officers of the Regular army. Such a measure would be the wisest possible, and would prove of incalculable value in the rapid and proper development of the Canadian military power, and of its proper application in time of war.

It is probable that the general features of the English organization would be followed by the Canadian authorities in everything except that of infantry, which, in view of what it would have to meet in our Army, will no doubt be given a regimental organization of twelve companies of three battalions, with a fourth battalion for the depot. This last will collect and train the new levies from which the field battalions draw their recruits, and will aid in the local defense from any sudden attack. The present territorial organization points directly to such a tactical one, and was no doubt adopted for the purpose, and there can be little doubt that this most valuable feature of organization of the war-

wise Germans will be applied in the event of war as being the best possible.

Any increase in the strength of the present organization will leave a deficiency in cavalry and field artillery which cannot be secured in any system of militia however perfect, on account of the cost and the time required to secure any reasonable degree of efficiency. These will have to be made good from England. The English cavalry consists of 31 regiments, mostly serving in Great Britain, but there will not be need for large numbers of this arm. There are in the Royal Regiment of Artillery 205 batteries; of these, 31 are horse batteries, and 83 field batteries, most of which serve in Great Britain, and can readily be brought to Canada; leaving their horses, if necessary, to mount other batteries in England, but bringing all of their armament and equipments, and finding plenty of good horses upon their arrival in Canada. It would require 18 field and 24 horse batteries to be added to the present organization to make it complete as hereafter indicated; and this number, and of the best, could be brought over in a very short time.

For the transportation of war material, stores, etc., besides the means for water transportation, and by ordinary roads, the Canadian railway system comprises 11,970 miles of track; 1524 engines; 1252 passenger, 403 baggage, mail and express, and 38,313 freight cars.

In order to indicate clearly in a military form the possibilities of the Canadian organization and war strength, we may suppose the mobilization of their organization changed as indicated, the present battalions representing regiments in war, exactly as they generally do in the English army.

The result would be as follows:

Regiment of Artillery, 24 horse batteries.....	.....	.....	4,608
" " " 36 field " (+ 18)*	.....	.....	7,344
" " " 3 garrison " (+ 44)*	.....	.....	480
Total.....			12,432

ONTARIO.

1st Military District.

1 Regiment cavalry.....	1,200	3 Field batteries.....	.....	612
12 " infantry.....	19,920	1 Garrison battery.....	.....	160
Total.....				21,892

* Not counted here but in the subsequent enumeration.

2d Military District.

2 Regiments cavalry.....	2,400	1 Battalion infantry.....	555
1 Battalion ".....	400	7 Field batteries.....	816
15 Regiments infantry	24,900	2 Garrison "	320
		Total.....	29,391

3d Military District.

2 Regiments cavalry.....	2,400	2 Field batteries.....	408
" infantry	14,940	1 Garrison battery.....	160
		Total.....	17,908

4th Military District.

2 Battalions cavalry.....	800	2 Field batteries.....	408
7 Regiments infantry.....	11,620	1 Garrison battery.....	160
		Total.....	12,988

Ontario, grand total..... 82,179

QUEBEC.

5th Military District.

2 Regiments cavalry.....	2,400	3 Field batteries.....	612
13 " infantry.....	21,580	7 Garrison "	1,120
1 " engineers.....	2,782		
		Total.....	28,320

6th Military District.

8 Regiments infantry.....			13,280
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7th Military District.

1 Regiment cavalry.....	1,200	1 Field battery.....	204
12 " infantry.....	19,920	6 Garrison batteries.....	960
		Total.....	22,284
		Quebec, grand total.....	64,058

NEW BRUNSWICK.

8th Military District.

1 Regiment cavalry.....	1,200	1 Battalion engineers.....	923
5 " infantry.....	8,300	2 Field batteries.....	408
1 Battalion "	555	5 garrison "	800
		New Brunswick, grand total....	12,186

NOVA SCOTIA.

9th Military District.

1 Battalion cavalry.....	400	1 Field battery.....	204
9 Regiments infantry	14,940	12 Garrison batteries.....	1,920
		Nova Scotia, grand total.....	17,464

MANITOBA.

10th Military District.

1 Battalion cavalry.....	400	1 Field artillery.....	204
2 Regiments infantry	3,320		
		Manitoba, grand total.....	3,924

BRITISH COLUMBIA.

11th Military District.

2 Regiments infantry.....	3,320	4 Garrison batteries.....	640
		British Columbia, grand total.....	3,960

PRINCE EDWARD ISLAND.

12th Military District.

1 Regiment infantry.....	1,660	5 Garrison batteries.....	800
1 Engineer company.....	239		
		Prince Edward Island, grand total.....	2,699
Dominion, grand total.....			198,788
Non-combatants, 6 per cent.....			11,927
First line.....			210,715
Dépôt battalions, batteries, troops, etc.....			62,428
			272,963

The first class numbers 292,311 men, and there would consequently remain after this organization has been completed, 19,348 men, and these, together with the men in the dépôt battalions, would supply about four drafts of 10 per cent. each to the field army ; it being now a well-established principle that as soon as any field organization loses 10 per cent. of its maximum strength, this deficiency must immediately be made good from the dépôt battalions, they being in time filled up again from the next line, or reserve.

The object, however, is to utilize not only all of the men in the 1st class but those in the 2d class also, the latter forming the Second Line. The 2d class numbers 97,382 available men, and these, with the remainder of the 1st class, give a total of 116,730 men. There are ninety-five dépôt battalions and two *reserve* battalions in each regimental division. These latter would require 105,450 men, and would very nearly absorb the 2d class, there being a surplus of but 11,280 men.

The dépôt battalions number	62,248 men.
Two <i>reserve</i> battalions.....	105,450 "
Total strength of the Second Line.....	167,698 "
Total in both Lines.....	378,413 "

The third class, 269,829, and the fourth class, 171,070, total 440,899, effectives, yet remain untouched, and a third line can readily be ordered at any time, giving, say 157,700 men, with over 280,000 effectives not yet called out.

RECAPITULATION.

Engineers.

1 regiment	2,782
1 battalion	923
1 company	239

Regiments Artillery.

24 horse batteries	4,608
36 field batteries (+18)	7,344
47 garrison batteries	7,520(3,762)

Cavalry.

9 regiments	10,800
5 battalions	2,000

Infantry.

95 regiments	157,700
2 battalions	1,110
Non-Combatants 6 per cent	11,927

First Line..... 210,715.468 guns.

Dépôt Battalions, Batteries, etc.

Engineers ; 1 battalion	923
Artillery ; 10 batteries	2,040
Cavalry ; 10 "	4,000
Infantry ; 95 "	52,725
	62,248

Landwehr.

Infantry ; 190 battalions	105,450
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Second Line..... 167,698.60 guns

Reserve.

Infantry ; 95 regiments	157,700
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Third Line	157,700
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Grand Total..... 536,113.528 guns

When the Landwehr is called out, add non-combatants..... 10,062
and with the reserve..... 9,460

19,522

Aggregate..... 555,635

We know that the military system is, and in case of war will continue to be, under the control of professional and highly trained soldiers. The key to the system on which the forces will be organized for war is plainly given, and we can thus judge with a reasonable degree of certainty as to how the details will be worked out. At any rate, we may be well assured that whatever organization may be authorized, its details for the time being are now perfected for each and every subdivision of each military district; with the list of officers, etc., completed, and revised from time to time. When war comes, there will be no question of enacting laws to provide the organization, and of procuring arms and equipments from we know not where. Notice will be sent to each headquarters to fill up the commands already organized, the officers selected will be notified; the necessary number from each class called out; all of the arms and equipments will at once be sent from England, if indeed, this has not already been done in anticipation of war; and, in a time so short that we will not be able to realize it, this organization will be converted into an actual army, and, as we might possibly find to our cost, an active army.

That the magnificent results obtained by the Germans in this direction, will or can be even closely approached, is not to be expected. But the power and ability exists for securing results such as we cannot possibly expect in the United States, under our present crude systems and laws, and especially will this be so if the Canadians are to have at their free disposal, all of the mighty military resources of England, while her fleets shut us off from the rest of the world, and limit us to our own undeveloped resources.

The military force of England must also be included in every calculation respecting our operations against Canada.

Regular Army.	200,000
Reserves and Auxiliaries	346,651
Mariners, etc.	127,449
<hr/> Total	674,090

Armament.—There are on hand in the Dominion 748 guns of all descriptions, from Gatling guns up to and including 7-inch breech-loading wrought-iron guns, and a few 12-inch rifles and other navy guns; also 70,000 Snyder rifles, 40,000 being in the hands of the troops. There are also 2000 Winchester rifles, and

a considerable number of other arms and equipments for cavalry. The field artillery is armed with the M. L. 16 pdr., the equipment being complete in guns, carriages, harness, etc.

In case of war, England would of course quickly furnish all the armament necessary. Her military policy requires not less than 600,000 stand of approved arms to be kept in store or packed ready for shipment to any part of the world. Seventy-five thousand stand of arms, together with 100 rounds for each rifle, will weigh about 1000 tons. These can be loaded upon one of the powerful and swift English steamers within thirty hours; and seven days more would bring the vessel to the wharf in Quebec. Within ten days from the date of notification, therefore, the arms and ammunition would be at Toronto, London, or the Welland Canal for distribution to the troops, in place of the Snyder rifles. A single vessel could readily carry 150,000 rifles, etc., and four of them a full supply for the maximum force indicated.

V. THE BEST MODE OF CONDUCTING OPERATIONS ALONG THE ENTIRE LINE, AFTER THE OUTBREAK OF HOSTILITIES.

There is a trite old saying that "history continually repeats itself," and before entering upon the discussion of this feature of the subject, it may be well to review briefly the history which may be expected to repeat itself in this case.

At the time of the conquest of Canada in 1758-60, the population of the British Colonies was twenty times as great as that of Canada (at present that of the United States is about twelve times as great) the latter having for her only aid the gallant Montcalm and his little army of less than 5000 Frenchmen. She was cut off from France by the navy of England, then as now mistress of the seas, whose power was then wielded with that of the Colonies to invade Canada. Under Abercrombie 9024 provincials assembled on the shores of Lake George, and by their side were the tents of the Regular army, numbering 6367 men. On July 5, 1758, this armament of more than 15,000 men, the largest body of European origin that had ever assembled in America, broke camp and moved against Montcalm's forces, amounting to 2800 French and 450 Canadians, to which de Levi had joined himself with 400 chosen men. On the 6th of July the English and Americans attacked, lost 1967 in killed and wounded (chiefly Regulars of course), and then fled in confusion.

Bradstreet, with 2700 men, started for Fort Fontenac, crossed

Lake Ontario in open boats, and landed on the 25th of August within a mile of that fort. The fort was razed, and the expedition returned to Lake George.

1759. The census of Canada showed a population of but 82,600 souls, of whom not more than 7000 men could serve as soldiers. The eight French battalions counted but 3300 men, and but scant supplies had been received from France. There was great scarcity in the land. The fields were hardly cultivated; the domestic animals were failing; the soldiers were unpaid; paper money had increased to 30,000,000 livres, and would that year be increased twenty millions more. The English had almost 50,000 men under arms, of whom, including the Royal Americans, 22,000 were Regulars. Added to these were the fleet of England; an armed force nearly equal in numbers to every man, woman and child in Canada.

In July Prideaux, with a large force, defeated D'Aubray's 1200 men, and Fort Niagara was taken. De Levi left Quebec and occupied the passes of the St. Lawrence at Ogdensburg with a small force.

Amherst assembled his main army at Lake George, and in five British regiments with the Royal Americans, he had 5743 Regulars. Of provincials, including Gage's light infantry, he had over 10,000 more. Fort Carrillon, garrisoned by 400 men, was taken, and the French abandoned Ticonderoga, and retreated from Crown Point to intrench themselves at Isle-aux-Noix.

The capture of Louisburg was a ray of light through dark clouds.

After this event Wolfe had 8000 Regulars. The fleet under Saunders included 22 ships of the line, and as many frigates and armed vessels, with over 20,000 sailors and marines. In June the whole armament arrived off the Isle of Orleans. In September, 1759, the armies met upon the heights of Abraham. Wolfe's army was composed of well-equipped Regulars. Montcalm's of six wasted battalions of Regular troops, and the Canadian militia, "boys of 15 to old men of 70." The result was inevitable, and Quebec fell.

In 1760 Amherst had nothing of consequence to oppose him and he led an army of 10,000 men, mostly Americans, toward Montreal; passed down the river without opposition, and on September 8th the cross of St. George floated over the gates of Montreal, an open town, of a few hundred inhabitants.

Canada had fallen, but it had taken 50,000 armed English, with nearly 30,000 sailors and marines, nearly three years to conquer a half starved population of less than 100,000 French, aided by eight battalions of Regulars, less than 5000 strong.

War of 1812.—During this War Canada had the aid of England, but that nation was obliged to pay far more attention to Napoleon than to all else besides, and on that account, no doubt tacitly abandoned her war with us just before the final great struggle at Waterloo. But she did not do even this, until we agreed to terms which reflect no credit upon this nation, after the stand taken at the commencement of the War.

The Declaration of War.—June 3, 1812, the President sent his message to Congress, declaring war, and that body commenced to "debate," and kept this up until the 18th, when the act declaring war was finally passed. A repetition of this kind of history would probably find English fleets in our harbors awaiting the declaration of war. On the other hand, should England determine to declare war, as she undoubtedly will if one becomes inevitable, she would, in our present condition, send her fleets to do it, and accompany such declaration with instant assault.

The military history of this War is not pleasant reading. There were in the Army at one time or another while it lasted 15,605 officers and 220,206 men, or a total of 235,811 men. Of this number there were 1877 killed and 3737 wounded, a total of 5614.

Our people now know enough about war to be capable of judging of what kind of warfare this list of killed and wounded is a measure. At the battle of Stone River the Union Army, numbering 43,400 men, lost in killed and wounded 8777. General Bragg reported his strength at 35,000 men, and his loss in killed and wounded at over 9000; a total in this one battle, out of 78,400 engaged, of over 17,000 killed and wounded.

It is needless to say that Canada was not subdued during this War. Fortunately for us, England had her hands full elsewhere. It was with the greatest difficulty upon our part that men could be secured for the Army, and active operations prosecuted. The desertions from the Army were simply frightful in number. The exact number cannot be ascertained, but probably exceeded fifty per cent. of the total strength of the Army.

The War with Mexico was a brilliant success for the Army, but even in the face of the rapid and decided success, there was, as

has always been the case, a powerful party in the country utterly opposed to the War and its prosecution.

Within our own times we have witnessed the greatest of all our wars. At its inception both parties were unprepared, the South indeed having to organize everything even from the government down ;—having to create everything, while we had not only the advantage of numbers, but of an organized government, and all that it implies ; with the markets of the world open to us for obtaining supplies. This War was waged with a leisure utterly inconsistent with modern practice, a condition which cannot obtain when the enemy possesses even ordinary preparation.

The population of the North was 19,614,885 freemen and 88,986 slaves ; that of the South 7,570,224 freemen and 3,860,571 slaves, and, not counting the border States and West Virginia, the War was actually waged by only about 5,500,000 whites. During the War 2,259,209 men were called out by the North, of whom 186,097 were colored, and of these 1,000,000 were under arms at the close of the War. It was found that the average available strength of the Army in the field was 693 men per 1000 of the aggregate.

Even the dullest intellect recognized the fact that this was a war waged to maintain the very life of the Nation, and one calculated to arouse to its highest pitch the spirit of patriotism. Nevertheless, there existed to an alarming extent the historical opposition to the maintenance and continuation of the War.

In case of a war with England for the acquisition of Canada, or for defense against oppression, we could not count upon even the enthusiasm which was then engendered both North and South. Such a war could not be for union, nor would union prevail. As usual, one great political party would oppose it, and, in the event of want of success on our part, would probably acquire possession of the Government, and terminate the war after the manner of that of 1812.

Suppose that the South had been favored by the natural strength of a frontier like that of Canada instead of being weakened by the open one she had to defend. Would the North then have found it an easy matter to invade her soil? Suppose she had had in addition the active aid of England's navy and army, and the mighty resources of her arsenals and dock-yards. She could then have shut up our ports, prevented

our obtaining supplies, ruined our commerce and business, while her ports would have been open to all the world, her soldiers supplied with arms and equipments at the shortest notice and to any desired extent. Fifty or a hundred thousand English Regular soldiers would, if necessary, have aided her in the field, and a fleet of gunboats would have attacked the North along the whole exposed lake frontier. Under such conditions how many years would the war have lasted before being brought to a successful issue? Yet this would, in our present unprepared condition, be just about what we would have to look forward to were we to attack Canada. In the present case we should, it is true, have both North and South together, but a mere suggestion of greater numbers would not add much to our strength.

When the utter defenselessness of the country is pointed out, attention is at once called to the fact that we possess "hundreds of thousands of veterans, trained upon scores of battle-fields, whose equals are scarcely to be found in the annals of war." That was rather an important fact to call to the attention of Napoleon III. twenty years ago, but it is getting to be rather too old now. At the close of the War of the Rebellion, the average age of the men in the Army was over twenty-five years, It is now over forty-five, the limit of age for military service in this country.

The status of this reliance in case of war is best illustrated as follows:

Total number of soldiers.....	2,259,209
Killed in action, died, etc.....	313,000
Died since close of the war.....	736,994
On pension rolls.....	292,000
Applied for pensions.....	338,000
Deserted during the war.....	508,494
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Total ineffectives.....	2,188,488
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Total effectives, 1887.....	70,721

It is needless to say that few of these are now within the limits of military age, or are fit for further military service, which must be confined to a younger generation.

It is true that many of the deserters from the Army during the last war are still living, which fact will somewhat modify the above statement, but dead or alive they are not to be depended

upon under any circumstances. The number of deserters given above is, no doubt, in excess of the actual number of intentional deserters, but such is the recorded number in the War Department. It demonstrates the humiliating fact that among that grand army of freemen who were engaged in the defense of a most sacred principle, more than one-fourth deemed it no disgrace to desert their flag and nation in the hour of greatest need.

The record of the War of 1812 presents a yet more shameful one than this.

These facts are not commonly known, or are put out of sight in discussing the possibilities of a future war. But to the trained and educated soldier they are matters of the most vital importance. He must carefully calculate and weigh every element in the chance of war, and if the past history of our own country demonstrates the fact that the reduction in the numbers of our Army will be greater from desertion than from deaths, wounds and disease, most certainly this fact is one for the gravest consideration. Coupled with this is another fact. Of this vast army 776,829, or one-third of the entire army, had to be *drafted* to insure their patriotic services; and many hundreds of thousands more were only tempted to give their sadly perilled country the benefit of their services by the most extravagant system of bounties of which we have record.

These facts are of the utmost significance, as tending to show that in a great and prolonged war, dependence cannot be placed upon the system of volunteer soldiers alone for obtaining all of the men that the necessities of the country may demand. Wise laws must be framed to meet these emergencies; especially to prevent the enormous loss from desertion, which has been so shamefully prevalent in all of our wars.

The strength of the forces needed in case of war cannot readily be ascertained, as the different factors of the problem are too indeterminate. Any estimate that will give, with some degree of accuracy, the numbers that will be found necessary, will no doubt be received with incredulity, as was that of General Sherman's in October, 1861, "that it would require 200,000 men to carry on the War in the Kentucky theatre of operations." For making it he was denounced, and deemed crazy, insane, mad. Nevertheless, on the 10th day of April, 1864, there was in that same theatre of war an aggregate strength of 352,265

men, and there does not seem to have been any too many, either.

At the battle of Gravelotte the Germans numbered 2.1 men to each French soldier, and the battle itself was not a success of the most decided kind.

Of course it is well understood that successful strategy will bring a preponderating force to bear at the decisive point, even when the total numbers of combatants are equal. But it is also a well-recognized fact that, other things being equal, the offensive invading army must be at least one-half stronger in number than the defensive one, and this proportion of necessity must increase as the line of invasion is lengthened. The basis of any calculation then will be the strength and character of the forces that the enemy will bring into the field, as well as the nature of the war, and of its theatre. If the Canadians can bring into the field, in case of great emergency, the numbers heretofore indicated—and there seems little reason to doubt their ability to do so—at least for the five months in the year when campaigning is possible), when England furnishes the arms, equipments, pay, etc., we will have to meet in their first line 210,715 men, with 316,072 on our part. When the second line is called out, 388,413 with 582,619 men. And when the third line is also called out to repel invasion 555,635, with 833,442 men in our armies. And this without taking into consideration the necessity of increased force for the protection of our lengthened lines of communications and our extended and defenseless sea-coast, or the fact that forces may arrive from England or elsewhere.

If it were deemed advisable to call out such a force as this, advantage might be taken of the political division of the country into Congressional districts. Of these there are 325, with 8 Territories, each containing about 23,000 men, available for military service. One 12-company regiment from each—(30, say, being cavalry, and 20 engineers and artillery, with 100 men to a troop of cavalry, and 150 to a company)—would furnish a force of :

Infantry, 283 regiments	509,400
Cavalry, 30 "	36,000
Engineers, 5 "	9,000
Heavy Artillery, 15 regiments	27,000
Field Artillery (3 guns per 1000 men) 300 batteries	45,000
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Total Volunteers	626,400

Regular Infantry, 25 regiments.....	45,000
Cavalry, 10 regiments.....	12,000
Engineers, 5 companies.....	750
Artillery, 5 regiments.....	9,000
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Total Regulars.....	66,750
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Non-Combatants, 6 per cent.....	40,000
Reserve Companies 335 at 250 each.....	83,750
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Grand Total.....	816,900

It is needless to say that every officer should have rank and pay commensurate with his command. The "laborer is worthy of his hire," especially in the field, in time of war. No greater absurdity can exist in an army, nor one more calculated to weaken the authority of officers in high command, than to have several of the same grade; one commanding a division, another half a dozen divisions, another half a dozen army corps, and still another half a dozen armies, as was the case during our prolonged War. Perhaps commissions by brevet would serve the purpose, the officer exercising command, etc., upon assignment by the President.

As has already been stated, the experiences of our last War demonstrated the fact that the average available strength of the Army in the field was 693 men per 1000 of the aggregate; hence to bring the forces here indicated to bear against the enemy, will if organized and recruited under the old system, necessitate an aggregate strength of 1,202,604 men for the attack of Canada alone; while the enemy, at home, for the few months required for active service in emergency, and under their system, will present very nearly their maximum strength.

In developing the military strength of the nation, recourse would be had to volunteers, enlisted for the war, upon special conditions as to pay, etc., as defined by law. But that most pernicious and vicious system of organizing new regiments, whenever the strength of those at the front becomes too weak, should never again be permitted; even though we have to resort at once to the draft to keep the organizations in the field complete in numbers. If the strength of the Army with all regiments filled is not sufficient, then of course new regiments must be raised. Unless due care be exercised in this respect, and wise laws enacted, and rigidly enforced respecting desertion, any war will cost in money alone, not less than twenty-five per cent. more than it ought, and much more in the loss of efficiency.

A thousand men drafted into an old regiment at the front, which is already provided with officers, non-commissioned officers, and some men already trained and experienced in actual war, are worth two or three times their number sent forward in the shape of new regiments. Even when an increase of the Army becomes necessary, it would be better to increase the strength of the organizations already existing. The officers will then have become more competent to command the increased numbers than they were the original numbers at the beginning of the war.

The essence of the territorial system with us would be restricted to the regimental district and to its subdivisions. A dépôt battalion would not perhaps serve the double purpose of a dépôt and school for recruits, and also a force for the field in case of emergency; but for the former purposes only. In each State a sufficient number of companies should be organized at one or more places to receive and train all of the recruits necessary to keep the field force up to the maximum. This would be found less costly, and much more efficient than to have dépôt battalions, or even companies for each regiment scattered over the State.

The regiments should be United States Volunteers, with professional soldiers for field and general officers, since those of the Canadian forces would unquestionably be appointed by Her Majesty from among the best officers of her Regular army. This would be a measure of inestimable value to such forces; worth more than an army with banners.

Regimental districts to furnish all men for the regiment is the rule in Europe, but is found to distribute the burdens of war, especially of loss in battle—unequally. It would be better to draw the recruits equally from the regimental districts, and then to let each recruit join the regiment from his own district so far as is possible, any deficiency to be made up by a general draft from the whole body of recruits. When the draft must be resorted to, which will soon be the case in such a war, individuals may be permitted to furnish substitutes, but should be held responsible for them in case of desertion; just as each regimental district must be held in like manner responsible for the men it furnishes.

Of course in an extreme case there would have to be obligatory service and no substitutes.

It would no doubt be a wise measure to divide the men from 18 to 45 years of age into two classes; the first class comprised

of those men who are unmarried, or widowers without children, and the second class embracing all the others within the military age : with of course the ordinary provisions for exemption.

This all indicates expenditure of money, and means increased taxation, and people would at once begin to ask, What will it cost? Will it pay?

The revenue for 1885 was \$323,690,706, and of this amount \$181,471,999 was derived from customs. In case of war with England in our present situation, this source of revenue would at once be extinguished, leaving only \$142,218,707, hardly half the current expenses of the Government. It would at once be discovered that the ability of the Government to borrow money at three per cent. with an overflowing treasury and so large a surplus of revenue that it was bothered to find a way to spend it, would suddenly cease when war brought about the annihilation of the customs receipts, and the need to borrow money by the thousand millions.

For the same year our imports amounted to \$577,527,329, and the exports to \$742,189,755, a total foreign business of \$1,319,717,084. War would put a stop to this enormous business at a blow, and the financial ruin it would cause surpasses calculation, and its effects reach every hamlet in the land. It is asserted that the effect must be as disastrous to England as to us, but not so. She will be at liberty to turn her interrupted trade into other channels, while we shall be completely bottled up.

This would be Russia's opportunity, who has been so often mentioned as likely to come to our aid.

She would seize so favorable an opportunity to build up her finances, to increase the prosperity of her empire and to put money into her pocket by stepping quickly into the vast grain, petroleum and other valuable trades which we should lose.

The fish-bone of contention would be at rest for a time; our fishermen not caring to approach even the three-mile limit.

Men would be thrown out of employment by the hundred thousands, and business disorganized and ruined in every direction. In fact, it would at once become apparent that going to war with a nation capable of blockading our ports, or of seizing the great centres of our commerce and finance, was quite a different thing from our last War; when we closed the ports of our enemy, while our own remained open to the commerce of all the

world, with every market open to us for the purchase of war material. Instead of having for an enemy a people thus shut up, who had to perfect their organizations, even from the very foundation of their government, we would have to meet one vastly better prepared for war than ourselves, and the consequences would at once become apparent, and by no means to our advantage.

These are some of the facts revealed by an inspection of our past history and present situation. They do not appear to point out "the best mode of conducting operations along the entire line *after* the outbreak of hostilities," nor yet to any satisfactory mode of so conducting them along any part of this line. It must be apparent to even the most obtuse mind that some adequate preparation must be made before such an outbreak, to insure any adequate measure of success, even for the successful defense of our northern frontier from the assaults of the enemy.

The limits of this paper will not admit of a discussion of what the mode of conducting operations should be. That it should comply with the well-defined and recognized methods of war, goes without saying. There would be required a retaining force on the eastern frontier of Maine. It will be of the utmost importance that a garrison of greater strength than a single ordnance sergeant be furnished Fort Montgomery, if peradventure a sufficient one can be thrown into that place before the enemy gets possession. It should never be without a sufficient garrison even for a single day. The Canadian 51st battalion at Hemingford, and the 60th at Clarenceville are both much nearer by rail, or common roads, to this fort than any of our military organizations. These battalions at present muster 688 well-armed and equipped men, and in case England declared war against us, could readily seize this undefended place, and thus open a passage for all their gunboats drawing less than seven feet of water, into Lake Champlain, and toward Albany, our great central base of operations.

The next point, and one of vital importance, is to secure the possession or destruction of the St. Lawrence canals, near Morrisburg. For, should the enemy hold possession of these for only the time necessary for the English gunboats to cross the ocean, it will assure the passage of a fleet of his war vessels into Lake Ontario. Our nearest force consists of the few companies at Sacket's Harbor, while the enemy will have available within

the immediate vicinity the 41st, 42d, 56th and 59th battalions, at present numbering 1280 men; and within a less distance than our forces, the 4th cavalry, 14th, 47th, 43d and 18th battalions and three field batteries, at present numbering 1848 men and 18 guns. This force of over 3000 men and 18 field guns, all nearer by rail to the scene of operations than any force we have within more than double the distance (except those mentioned) would, without the shadow of a doubt, seize the south bank of the river, and before we could dispatch a single armed man to the scene of operations, could secure such positions and intrench them to such a degree that nothing short of a considerable force of well-organized and armed troops could dislodge them. In fact, before we could transport any adequate force at all to this point, the Canadian battalions will have been filled up to their war strength of over 14,000 men, requiring 12,000 of the 30,000 arms in store.

The proper officers have no doubt selected the sites to be fortified, and have ready the plans of the earthworks necessary. Railway workmen and others with the necessary tools would be collected from every direction. Guns and carriages would be sent from Kingston and Montreal, with a brigade of garrison artillery from the latter place to serve them; and in a time so short that none can realize it, they will have established themselves in such a manner that nothing but a most resolute and determined attack by a large force, will be able to dislodge them. If this be not prevented within thirteen days, we must expect to see the English gunboats passing through the canals. This would seem to reveal a state of affairs upon our part, of startling gravity. But there is not the slightest doubt as to the ability of the Canadians to realize it with the greatest ease. And there is no more doubt but that the professional soldiers who perfected their organizations, their distribution, and that of their arms and military equipments and supplies, had just exactly this movement in view, and for the express purpose indicated. Well knowing that if they could only hold on for the thirteen days necessary to pass the English fleet into the lake, the full benefits to be expected will have been realized, and we will then be welcome to the place, if we can get it.

It is often suggested that parties of citizens might cross the river and destroy the locks of these canals. Such a thing is not at all probable from this sparsely settled part of New York, and

even if it were, when private citizens attempt to make public war in this manner, and are caught (which would almost certainly be the case), they are hung with an astonishing degree of promptness, quite discouraging to the advocates, and especially to the would-be participants of such warfare.

The next point of the frontier, and one of equally vital importance, is the Niagara River, and the Welland Canal. This canal, controlled by the Canadians, will enable them to pass any English war vessels that may gain access to the lower lake, up into Lake Erie; as well as any vessels they may be enabled to fit out in the well-fortified harbor and completely equipped dock-yards of Kingston.

The Welland Canal is entirely out of reach of guns from our shore. The nearest troops we have, are two companies at Fort Niagara, two more at Buffalo, with two regiments and a battery of militia at the latter place, in all 1300 men. The Canadians have the 44th battalion, 392 men, at Clifton, which would at once destroy all of the bridges at that point, and then join the field battery at Welland for the defense of the canal against any attack from Buffalo, the 19th battalion, 299 men, remaining at St. Catharine's for the defense of the locks. Within about 100 miles by rail of this canal, the Canadians have 25 battalions, 2 regiments of cavalry, 7 field, and 1 garrison battery, with a total present strength of over 9000 men, and 42 guns, completely armed and equipped, while we cannot muster an equal force within three times that distance. These organizations filled up to the war strength, will comprise a force of 30,000 men, requiring 18,000 more of the arms held in store, and when completely organized will number over 45,000 men. Had we a sufficient force at hand, and could suddenly assume the initiative, we might have some chance of securing possession of at least a part of the canal for a short time. But that part will be the upper one, where it will be the most difficult of destruction.

The Canadian railway system could not be more favorably situated than it is for the concentration of her troops for the defense of this canal. With the bridges over the Niagara River destroyed, to cross it in the face of the forces they can quickly muster, will be no slight military achievement for the most skillful general, and the best disciplined armies. To make a descent by water from the Ontario side might be precarious, from the danger of attack from such vessels as the enemy can fit out upon

that lake, and of those which may arrive from England before the enterprise might be completed. The attack promises better from Lake Erie, where we have the predominance in commercial marine, and where our forces, most interested in this particular enterprise, can best be mustered.

To make such a descent upon an enemy's shore even with a thoroughly organized and disciplined army, without the co-operation of a regular navy, would be no common feat. But this canal must be destroyed, or we must get possession of it, and that too without delay, otherwise 14 days steaming from England will bring the English gunboats into the waters of Lake Erie, and with these two lakes under command of their fleet, any attack upon the Province of Ontario by us, will be an exceedingly difficult and dangerous operation to carry to a successful issue.

If England declares war, doubtless an effort will be made to seize Detroit. In this event the gunboats will have been started for Montreal, and the arms shipped to the proper points in the Dominion in advance, and, although at this point, as elsewhere, we would soon be able to concentrate a large army of men, we could not get the necessary arms and equipments for them. It is possible that the enemy might be able under such circumstances, to get war vessels into Lake Huron, but our chances for preventing it are much better than in either of the other cases.

From here, westward, the question of military operations is simple enough, as the country presents no military objectives of importance, save perhaps the Canadian Pacific Railway, and the great wheat producing regions, to get possession of which will give us little trouble.

Upon the Pacific we should secure possession of Victoria, Esquimalt, and the terminus of the railway. But with a powerful English fleet to deal with, the operation will not be a simple one, although the population of British Columbia is insignificant.

The great objective point of first consideration is of course Montreal, which secured, affords a base for operations against Quebec. Albany is our national base, and from it the old war paths of the Iroquois as surely indicate the line of operation, as can the best modern strategist. Montreal is at the head of the sea navigation, and the commencement of all of the different inland navigations, natural and artificial. It is also seated astride the railway system of the Dominion, and with it in our hands,

we hold within our grasp the very life of the Dominion : and from it could securely operate against the divided fragments. That we will be permitted to occupy it without such a struggle as England is capable of maintaining when once in earnest, it is idle to suppose.

That it is an easy matter to underestimate the military powers of Canada, even when backed by the might of England, as well as to exaggerate greatly our own present or immediately prospective military power, we have ample cause for knowing at all times. At the same time it has been demonstrated by the history of all times and of all countries that there is no surer way of bringing about mortification, defeat, and even national disaster. Jomini has laid it down as a rule that no country capable of quickly putting a force of 100,000 armed men into the field, is to be invaded with impunity, except by overwhelming numbers. That wise old strategist possibly never conceived that a nation, situated as we are at present, could be idiotic enough to provoke to war such a power as England, much less think of invading her territory.

The nature of the frontier of Canada proper, coupled with that of the winter climate, renders an attack upon the Dominion anything but a simple task. When we also have to count upon the resistance of the powers of the British Empire, with all of our great seaboard cities utterly at the mercy of her fleet, without military organization, without arms or warlike supplies, and without the power of obtaining them in the event of war, save by the slow process of manufacture; without a navy, and with the prospect of all our ship-yards being in the hands of the enemy within a few days after a declaration of war; in fact, without a proper development of any of the most common and vitally necessary resources of war even for our own adequate defense, it is sheer idiocy for the people of the United States, or any part of them, to dream of engaging in a war with England in our present condition, or of giving her any just cause for making war upon us. If we so do, and in the face of it attempt to mend our present absurdly defenseless condition, she might strike without a moment's warning, and, if she followed up the blow with vigor, it might and probably would be a long time before we could do her any serious damage. Meanwhile, she could surely count upon that inevitable feature of our past history, the termination of any war in which we do not continually reap sub-

stantial advantages, by the opposition party, and the peace-at-any-price people.

It may be claimed that such a presentation of the case is too pessimistic, but the endeavor has been made to present the facts as they at present exist, or have existed in our past history, and any one is at liberty to pass judgment upon them. In so doing it should always be borne in mind that a government such as ours, is less adapted to the prosecution of war in a proper and vigorous manner than any other, no matter how perfect the state of preparation may be.

No country possesses greater store of *undeveloped* military resources than the United States. No civilized country however poor, but surpasses it in developed resources of this nature. Until this country has properly developed some of them, has converted them into forts and armaments, ship-yards, ships and guns, arsenals and arms, with all of the vast and innumerable stores ("from a cradle to a coffin") required for the purposes of modern war, and withal, has organized an army and a navy of trained officers and men, in some degree representing the materialization of these great resources, and in numbers at least capable of directing their proper uses in war; until all this has been brought about this country is bound over hand and foot and under heavy bonds to keep the peace of nations, even with a neighbor apparently so insignificant as the Dominion of Canada.

THE DEVELOPMENT OF NAVAL ARMOR AND ITS ATTACK BY LAND ARTILLERY.*

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IN the investigation of this interesting subject, a knowledge of which is so important to the artillerist, we are met by many difficulties.

From the first, experiments have been carried on in all of the leading maritime countries of the world, and the whole history of armor development must be found in these different series of trials, independent one of the other, often following out different and divergent lines of development, and dependent, in great measure, upon the system of artillery in use in the country where the trial is made.

In pursuing this subject we must include in our investigations not only the quality of the armor plates themselves, but the method of placing them on vessels of war, the different systems of fastening and the kind and quality of backing.

As a matter of course, the attack is carried along parallel with the development of armor, and this requires, in order to be of any practical benefit, a knowledge of the gun and its charge, and more especially the particular kind and form of projectile used.

In the preparation of this paper I have consulted freely all standard authorities at hand, most frequently the works by Lieutenant Very, U. S. N., and Captain Browne, late R. A. I have endeavored to find the salient points in the mass of experiments presented by them, and to sift out the more important principles involved in the subject.

To Mr. Stevens, a citizen of the United States, belongs the credit of first recognizing the importance of armor for naval use; and, although he himself did not live to see the wonderful results of his theories, it cannot be doubted that, as followed

* Read before the class of officers at the Artillery School, Fort Monroe, Va., September, 1889.

out by his sons, these have had a great effect in shaping the growth of naval construction in this country.

The Stevens, father and sons, made valuable investigations concerning the resisting power of iron as against projectiles, and finally submitted a report to Congress on that subject.

In 1854, the Stevens' battery was begun, but after spending about three-quarters of a million, Congress allowed the matter to drop, and the battery was never completed.

Passing over the first rude experiments on armor, both in this country and in Europe, we come to the time when it was first used successfully on ships of war. In 1855 the French constructed three floating batteries with 4½ inches of iron armor, backed by 28 inches of oak; and, in the autumn of that year, these were tested in actual combat at Kinburn, where in four hours they silenced the forts that for many days had held the combined French and English fleets at bay. The armor consisted of solid plates fastened to the backing by through bolts, and was attacked by 68 and 32-pounder smooth bores, firing cast-iron shot. Here the contest between the gun and armor was actually inaugurated, and in this first phase of the fight we find the gun no match for the armor.

This victory worked a wonderful change in naval architecture and at once gave an impetus to the manufacture of iron plates for naval use. Previous to this time rolled plates, more than one half inch in thickness, were scarcely ever needed, and, naturally, great difficulties were encountered in the manufacture of four and four and one-half inch plates, of the required homogeneity, toughness, and ductility.

In England, in 1856, trial was made of plates furnished by different parties, without any limit being placed by the government as to their composition or method of manufacture. From these trials, and others made the following year, it was decided by the committee in charge that soft wrought-iron was the best material for armor plates, and that steel offered no effectual resistance to the projectile. About this time the keel of the *Gloire* was laid in France, and shortly afterward that of the *Warrior* in England, and both were launched in the same year with the *Monitor* and *New Ironsides* in the United States. The *Gloire* and the *Warrior* were both vertically armored, broadside ships, but of very different types. The *Gloire*, much the smaller of the two, was a wooden ship and completely covered with

armor; while the *Warrior* had an iron hull, and owing to her great length, was only partially armored. The maximum thickness on the *Gloire* was $4\frac{1}{2}$ inches, and on the *Warrior* $4\frac{1}{2}$ inches. One important difference in the placing of the armor on these two vessels was that in the *Warrior* the plates were tongued and grooved, while in the *Gloire* the joints were plain butted.

The *Monitor*, rendered famous by her victory over the Confederate ironclad *Merrimac*, was a very small iron vessel of low freeboard, carrying armor of a maximum thickness of 5 inches on the hull, backed by 23 inches of oak, and 11 inches on the turret, with no backing. The armor, of laminated type, was made up of plates one inch thick. It was well established that armor of this kind was much inferior to solid plates, but on account of the greater ease of manufacture and the gain in homogeneity it made perhaps the best disposition for the time.

The *New Ironsides*, the only example of an armored broadside ship built in this country, had $4\frac{1}{2}$ inch solid plates, with 21 inches of oak backing—that part over the casemate being inclined at an angle of 60 degrees with the horizontal.

The history of these two vessels is well known to all. They served their purpose well, and, without entering into particulars, it is sufficient to say that their armor was more than equal to any guns that could have been brought against them at that time.

Although the real development of armor must date from Kinsburn, it cannot be doubted that the battle between the *Monitor* and *Merrimac*, and the subsequent performances of the United States ironclads aroused the civilized world to the paramount importance of armor as applied to naval warfare, and immediately resulted in new trials, involving not only armor but the gun and projectile as well. From this time on, however, we must look to foreign countries for the best information on this subject.

Nor is it to be wondered at that when the Civil War closed, we, as a people, were lulled into a sense of false security. In our heavy smooth bores and Parrott rifles we had most effective guns for that period. We had a strong fleet of ironclads, ready for service at any time; and, above all, a nation of soldiers, competent to fight the guns and handle the ships—the hard school of experience had taught us that at least. But there we came to a halt, and have remained practically at a stand still ever since. Until within very few years our monitors and guns were

scarcely better than they were twenty-five years ago. As to armor, this is unquestionably true. Without investigating for ourselves we have been content to watch from a distance the results in other lands. While there is some excuse for the apathetic attitude of the people at large toward the Army and Navy and all that pertains to them, there can be none whatever for those in authority. Instead of just emerging from the age of the smooth-bore gun and wrought-iron armor, we should be well abreast of the leading nations of the world—not one of them has more at stake.

In the second epoch of the development of armor, the contest may be said to lie between the rifle in its earlier forms and wrought iron armor. And, as incidentally involved in the change from the smooth bore to the rifle, it might be well to mention in this place the two theories of the attack of armor, the relative value of which has never been definitely settled, and the discussion of which is gaining new importance in view of the direction taken in the latest development of steel and compound armor.

When a projectile strikes an armor plate, only a part of its striking energy is taken up in a deformation of the plate, all the rest is dissipated and wasted in three ways; viz., in changing the form of the projectile, in heating it, and in heating the plate. The useful energy is taken up partly by the penetration of the projectile into the plate, and partly in racking the system. In the first case the projectile has its effect over a small area, and in the latter it is spread over a comparatively large one, and acts by cracking the plate and loosening the fastenings. The relative proportion of energy taken up in penetration and in racking, depends upon the size, shape and material of the projectile, and upon the material of the plate, its thickness, its backing and the rigidity of its fastening. Thus it is, to some extent, under the control of both the attack and the defense.

The racking effect of a projectile is measured, approximately, by its total striking energy, while its penetrating effect is usually taken as proportional to its striking energy per inch of circumference. In all of the empirical formulae for the penetration of wrought-iron, one of these elements appears.

In the United States, for a long time, the racking theory held first place. We had a great number of smooth bore guns of large calibre, whose heavy, spherical projectiles had a powerful racking effect. But soon the quality of wrought-iron for plates im-

proved, being made much thicker, and the fastenings so arranged as to largely offset this racking. Then it became evident that the true theory of attack was to punch or perforate the armor. Indeed, the uselessness of attacking wrought-iron armor with a gun not a match for it is now well established. Partial penetration has little effect on such plates held by good bolts. We shall see later how the introduction of steel and compound armor has changed all this.

We may pass quickly over this second period, noting only the more radical changes and improvements.

From the first, great trouble had been found with armor fastenings. The earliest form, an ordinary bolt of $1\frac{1}{2}$ or 2 inches diameter, having a counter-sunk head held on the inside by a common nut, produced the great objection of tending to snap at the screw thread when the plate was struck, thus causing the nuts to fly about on the inside in the most dangerous manner. Besides, it was almost impossible to stop leakage around the heads. The reports of the behavior of our monitors in action are filled with accidents due to this defective fastening. In the *New Ironsides* the danger was avoided by using the French bolts, introduced about 1862—a special form of iron, wood screw with projecting thread and a conical counter-sunk head, as in the first form of bolt. The plate was held to the backing by the threads of the bolt, the end being some inches from the inner skin, thus there was no nut to fly about the decks.

The English, at about the same time, adopted the Palliser bolt, in which the shank was cut down to the same diameter as the bottom of the thread, so that when the bolt was under a stress, the elongation per unit of area was uniform throughout. Rubber washers were also used to advantage. The plate was cut away slightly to prevent nipping, and in the plate upon plate system. These were bolted together in pairs, and a spherical nut, at each end of the bolt, fitted into a hemispherical socket, giving a limited ball and socket motion to allow for any slight displacement of the plates in action. These bolts were retained until recently, when Schneider began to use bolts extending but a few inches into the back of the plate, leaving the face unbroken. As pertinent to this part of the subject it may be well to state that all efforts to connect the plates by tonguing and grooving or other complicated joints have been failures, the objection being that a strain upon one plate is transmitted to

others through the joints. As previously stated, the smooth bore gun had been practically abandoned in England, France and Germany by the year 1863, and the development of the rifle became so rapid that the gun soon passed the armor, as represented by the *Warrior* and *Gloire* targets. A Whitworth rifle, firing 130 pounder shells of mild steel, attacked a *Warrior* target with the result that every shell penetrated to the interior skin, where it exploded, blowing a hole clear through. Early in 1863, a great improvement in the disposition of the backing resulted from an invention of Mr. Chalmers. His target was made up of $3\frac{1}{4}$ inch plates, with a compound backing $10\frac{1}{4}$ inches thick, composed of horizontal layers of wood and iron plates, behind which was another thin plate having $3\frac{1}{4}$ inches of wood between it and the skin. In the trial it was attacked by the 68 and 150-pounder smooth-bores and 110-pounder rifle, and clearly proved that this disposition was superior to that of the *Warrior* target. In the report of the Iron Committee we find the following:—

"It was found that the $3\frac{1}{4}$ inch plates were much less distorted than the $4\frac{1}{2}$ inch plates on the *Warrior* target, and that the damage to the plates was much less than might have been expected from their thickness. The backing proved much more substantial than the backing of wood without the interposition of the iron plates, which seemed to prevent the crushing of the wood and the spreading of the fracture to the contiguous portions of the backing."

Owing to this very favorable report, Chalmers' backing became immediately applied to a new ironclad, the *Bellerophon*. This vessel had armor 6 inches thick, with a backing of 10 inches, and an inner skin made up of two $\frac{1}{4}$ -inch plates. Although considered a long step in advance, this target was hardly a match for the best rifles that could be brought against it, as, for instance, the 7-inch Whitworth. It was not until 1865 that armor caught up with the gun—in the disposition made for the water-line of the *Hercules*. The plates were 8 and 9 inches thick with 12 inches of backing, on the Chalmers' system. The Committee reported: "That a structure such as represented by the *Hercules*' target appears to be practically impenetrable by the heaviest known ordnance."

The success of armor was, however, of short duration. Before the *Hercules*, finished in 1868, could be fitted out for her first cruise, "the Russians had brought one of their new 11-inch rifles against a *Hercules* target, identical in every respect with her midship section at the water-line, and pierced it without difficulty at 1200 yards."

From this time on, the development of the heavy rifle and consequent increase in thickness of iron armor was wonderfully rapid. Nor must we lose sight of the importance of the projectile in the contest. In 1863 Palliser introduced his chilled shot, and, although not at first completely successful, it soon developed and in 1866 was adopted by England as an armor-piercing projectile. At the same time Grüson chilled shot came into use in Germany. Steel projectiles had scored many a victory, but it was not until later that the cost of manufacture was reduced sufficiently to warrant their general adoption. At the present time they have superseded almost entirely the chilled projectile for armor-piercing purposes. This great increase in the efficiency of projectiles became a potent factor in armor development. In order that the maximum amount of striking energy shall be transferred to the plate, it is essential that the projectile should hold together and resist deformation. Against soft wrought-iron armor the chilled shot accomplished this object almost perfectly; but later, when shot and compound armor came into play, it was found that, although just as hard as the steel projectile, the chilled steel lacked tenacity, and on impact broke up much worse than the latter in its best forms.

In 1872 we find the 12-inch Woolwich gun brought against 12 and 14 inches of iron, backed by 17 inches of oak, the target being the turret of the *Glatton*.

The plates and backing, though considerably damaged, were not completely perforated. During the same year, in Prussia, a 12-inch plate, backed by 18 inches of oak, was attacked by the 28 and 26 c.m. (11½ and 10¼ inch) Krupp guns. In this case the heavier gun showed itself about a match for the target at 175 yards. Already the rifle had increased so much in power that, in ten years after it had been declared that 4½ inches of iron was sufficient to keep out any projectile, it required plates of three times that thickness to accomplish this purpose. In quick succession appeared the 12½-inch Woolwich gun, Krupp's 35 c.m. (14½ inch), the 81-ton Woolwich, Krupp's 40 c.m. (16 inch), and, finally, Armstrong's 100-ton gun.

It was thought, at this time, that in 12-inch solid plates the limit of thickness had been reached, and in England they introduced the "Sandwich" armor. This, as the name implies, consisted of two or more plates, with a certain thickness of backing between each pair, the whole being bolted to the main back-

ing. After many trials, it was found that the best thickness of backing between plates was about 5 inches, usually placed in two layers, one horizontal, the other vertical.

This disposition is undoubtedly a good one, but it applies rather to defenses on land than on the sea.

On land there is practically no limit to the number of plates that can be sandwiched together, and plates may be added without difficulty as often as needed for strengthening the fortification. For vessels of war, the limit of thickness and weight of armor is soon reached. As far as I can learn, sandwich armor has only been used upon two vessels—both English men-of-war—the *Dreadnought* and the *Inflexible*. The first carried on her turret 14 inches of iron in two thicknesses, with 9 inches of teak between, the whole backed by 6 inches of teak. Although superior in resisting power to the *Glatton* turret, this was no match for any of the heavy guns mentioned above.

The armor of the *Inflexible*, at her water-line, consisted of a 12-inch plate, 11 inches of teak, a second 12-inch plate, 6 inches of teak, strengthened on the Chalmers' plan, and a skin of two 1-inch plates.

The English naval authorities of the time thought this vessel to be well-nigh invulnerable. Before she was launched, however, the Armstrong 100-ton gun, capable of piercing at the muzzle a 26-inch solid plate, had been completed, and her invulnerability was gone. Later she received a turret of compound armor, and is still one of the most powerful battle-ships afloat.

Emulating the example of England, and aroused to the importance of a powerful navy, the Italians determined to possess the most formidable war vessels afloat, both in defensive and offensive qualities.

There resulted the designs for the *Duilio* and *Dandolo*. Armstrong received his first order for 100-ton guns, and in order to determine the quality and thickness of armor for the two vessels, the Italian authorities called for test plates of 22-inch solid armor from all of the principal manufacturers of the world.

The trial took place at Spezia in the autumn of 1876. There, wrought iron, as used for naval armor, received its death-blow. These trials formed the great turning point in armor manufacture and naturally separate the second epoch of armor development from the last; the modern high-power rifle as against steel and compound plates.

At the trial there were represented two English firms, Cammel & Co. and Brown & Co., and two French firms, Marrel and Schneider.

The Brown plates were 22-inch solid iron, with 29 inches of teak backing and $1\frac{1}{2}$ inch skin, held together by through bolts with countersunk heads. Both Cammel and Marrel submitted one solid 22-inch plate, backed as above, and also two sandwich targets, in which the total thickness of iron was 22 inches, one of each having an 8-inch face plate of wrought iron and in rear $1\frac{1}{4}$ inches of chilled iron.

These targets were attacked by 10-inch and 11-inch Woolwich guns and by the 100-ton Armstrong, received the year before by the Italians. This last was by far the most powerful gun in the world at that time and known to be much more than a match for any of the iron targets.

The 100-ton Armstrong had a muzzle energy of 36,178 ft. tons, that of the 11-inch 7015, and of the 10-inch 5356,—the corresponding perforation of wrought iron being 26.3, 14.3 and 12.9 inches, respectively. The test was to be a single shot from the 10-inch gun, a salvo from the 10-inch and 11-inch and finally a single shot from the 100-ton Armstrong.

The 10-inch and 11-inch shots, while damaging all of the targets to a greater or less extent, had the greatest effect on the Schneider all-steel plates. Still, when the crucial test of the 100-ton gun came, there was no doubt as to the respective power of resistance of the two types. No piece of plate or projectile got through the skin of the Schneider targets, while all of the others were perforated with the greatest ease.

In their report the Italian Commission did not hesitate to pronounce the sandwich system of armor much inferior to the single plate system. In comparing the iron with the steel plates they go on to say:

"In considering that within the limits of power developed the defensive qualities of the three iron plates were about equal, since none of them could stop the 100-ton projectile from complete perforation, whilst the Schneider plate did succeed, the question may be put under a more general aspect, and the comparison may be established between ordinary iron plates and Schneider ones by enumerating for both the advantages and faults determined by the tests.

"If we examine, in the first place, the iron plates we recognize in them the following advantages:

"1st. The smashing produced on them by impact is more localized at the point of surface struck.

"2d. They behave better for relatively moderate impact produced by projectiles of ordinary calibres.

"Against these advantages are the following faults :

"1st. Lack of continuity in the mass, arising from the difficulty of forging and rolling plates of such great thickness.

"2d. Relatively less tenacity than the Schneider, and consequently less resistance to penetration.

"3d. Absolute impossibility of preventing complete penetration within the limits of thickness given and power developed.

"The Schneider plates, on the other hand, show the following advantages :

"1st. Greater absolute tenacity and greater certainty of obtaining complete homogeneity in the mass.

"2d. Greater resistance to penetration. Within the limits of the power developed, the target may be depended upon for protection against perforation.

"On the other hand the following faults may be imputed to it :

"1st. A crystalline structure of an aspect almost glassy, which renders the plates more easy to split, even under shocks relatively feeble.

"2d. Greater ease of breaking in pieces, and leaving the frame exposed.

"Considering the energy of guns actually used on vessels and in coast batteries, we may admit that a vessel would be thoroughly protected by either iron or Schneider plates, provided that the thickness was equal to that tested; but the local effects on the plates seem, under these conditions, to be most objectionable on the soft steel plates.

"From this aspect, the use of iron plates would, therefore, seem preferable, but in looking ahead to the near future we can see, without a possible doubt, that this relative advantage of iron is but temporary, and consequently of a nature to expose a vessel so protected to shortly lose her supremacy, which, in the other case, is assured in attack.

"Consequently, after all these considerations, the Commission has no hesitation in declaring and proposing, as the most advantageous disposition, the single plate presented by Schneider."

On the strength of this report, the Italians adopted as the armor for the *Duilio* and *Dandolo* 22-inch solid steel plates by Schneider.

The Schneider plates so successful at this trial, although included in the broad, general class of steel, differed greatly from any steel plates that had been previously tried. The "Iron Committee," in the early sixties, after exhaustive tests, had decided "that soft wrought-iron was the best material for armor plates, and that steel offered no effectual resistance to the projectile."

But the steel there referred to was the ordinary hard steel, containing, probably in every case, not less than one per cent. of carbon, whereas the steel of the Schneider plates in the first Spezia trials contained little more than one-third of that amount. This was long known as homogeneous metal, but is now gener-

ally designated as "mild steel." Of course the exact composition of the metal and the finer details of manufacture are secrets of the trade. In general terms, the cast ingot is subjected to a careful working, and reduced to the required thickness by hammering or rolling. Schneider uses a 100-ton hammer for his heavier work. After being given the required thickness and shape, it is annealed, the face oil-tempered, and, finally, the whole subjected to a partial reannealing to remove any internal tempering strains. The result is a metal of much greater toughness and tenacity than wrought-iron, while softer and less brittle than the proper hard-tempered steel.

For some time previous to the Spezia trial of 1876, desultory experiments had been made in England with a combination of steel with wrought-iron, but with ill success. The authorities were immediately aroused to great activity by the result in Italy, and in 1877 a competition, known as the "First Nettle Trial," was begun—plates being presented by English firms alone. Of the five plates, one was from Whitworth of untempered steel, plugged with hard steel bolts, three from Cammel, one of mild steel (containing $\frac{1}{100}$ per cent. of carbon), and two compound. All were compared with a wrought-iron plate of the best manufacture. They were 9 inches thick, and were attacked by a 9-inch rifle at ten yards range. It is not necessary to go into the particulars of this trial, as it is only important as the first instance where all-steel and compound armor were brought into direct competition.

The steel plates were clearly victorious—no projectile penetrating to the backing.

In the compound plates the penetration was much greater and the cracking more serious. The iron plate was completely perforated by each shot, the projectile sticking in the backing.

From the very beginning the rivalry between the two systems has been active, England with all her prestige as the greatest naval power of the world has steadily favored compound armor and, necessarily the development has been rapid and marked by great improvements. On the other hand, she has given very little encouragement to the manufacturers of all-steel plates, hardly as much as their success in the early competitions deserved.

The great exponent of the all-steel system is Schneider of France, and he has obtained many converts.

The leading manufacturers of armor in England are Cammel and Brown, the former using Wilson's patent and the latter Ellis'.

The two processes differ somewhat in the details, although they turn out plates of about the same resisting power. In Wilson's first process molten steel, manufactured by the Siemens-Martin process, is poured on an iron backing plate made up of thin plates which are united,* "but not thoroughly worked up and amalgamated."

The whole is afterwards taken from the furnace and passed through heavy rollers. In some cases the iron plate is placed on end and the steel run in alongside, giving a greater density in the face. The furnace in this process is of special form and serves as a mould for the face plate. The face is afterwards tempered and annealed. In Wilson's second process a certain thickness of very mild steel is run on one face of the iron plate, after which it is reduced to about two-thirds of its original thickness by rolling or hammering, when a layer of steel containing a high percentage of carbon † (1.25 to 1.05 per cent) is run on the other face. The whole is rolled or hammered as before. This process is said to give plates remarkable powers of resistance.

Under Ellis' patent the hard steel face and the iron plate are manufactured separately; they are placed in a furnace and raised to a welding heat, when molten Bessemer steel of soft quality is run between them. They are then rolled, tempered and annealed as in Wilson's process. The first Wilson plates are softer than Ellis', thus allowing greater penetration, but at the same time limiting the racking effect. The tendency is, as in Wilson's second process, to make the face of harder steel,—indeed, the same thing may be said of the all-steel plates.

Competitive trials between these two classes of armor, all steel and compound, have been held at different times at Gâvres, Spezia, and other places on the Continent with varying results.

By the second Spezia trial, which occurred in 1882, the Italians expected to determine the best description of armor for future use. They had already ordered the armor for the *Italia* from Messrs. Cammel in England, but for her sister ship, the *Lepanto*, the question was as yet undecided.

The plates were 18.9 inches thick, each weighing 31½ tons,

* See "Browne on armor." p. 88, II.

† See Meigs & Ingersoll, p. 153.

and they were attacked by a 100-ton M. L. Armstrong rifle. Three firms were represented, Cammel, Brown and Schneider. The projectile used was of Gregorini chilled iron, 44½ inches long, with the head struck with a radius of 1½ diameters. The firing at all of the plates was under strictly similar conditions, the charge being reduced in the first round so as to give about 21,000 ft. tons striking energy, equal to a perforation of wrought iron of about 19 inches, and in the second and third a perforation of 25 inches, with a total striking energy of nearly 34,000 ft. tons. In the first round both compound plates showed cracks more or less serious, the Schneider plate showing none at all. The second round developed through cracks in the steel plate, and in the compound ones to such an extent as to put them *hors de combat*. The Schneider plate received two more shots with steel projectiles having striking energies as in the last, and at the end was still in condition to offer good resistance to any projectile.

This competition was clearly in favor of the Schneider plates. The English firms ascribed a great part of the ill success of the compound plates as compared with Schneider's to the difference in bolting, Schneider having used more than three times as many bolts in his plate as either Cammel or Brown.

In November, 1882, there was a competition in Russia, on a smaller scale between a Schneider and a Cammel plate. The plates were in this instance 12 inches thick, and were attacked by an 11-inch breech-loading rifle.

The compound plate held up better than the all-steel one, about $\frac{1}{2}$ of the latter being detached from its backing at the third shot.

In 1884 another trial between Schneider, Cammel and Brown plates took place in Italy, the plates being of the same thickness as those used on the *Italia*. They were to be attacked first by the 100-ton Armstrong, B. L., firing a shot at the centre of each target, followed by a round at each of the four corners from a 10-inch gun, all with the best steel projectiles. The striking energy of the projectile from the 100-ton gun was 44,340 ft. tons or 8339 ft. tons per inch of circumference, equal to a perforation of iron of 30.27 inches. The plates were clearly overmatched, and consequently we are prepared to find that each plate was completely perforated at the first shot, but not that both compound plates were so demolished that further firing was impossible after the second round from the 10-inch gun, while the Schneider plate

stood well up to its work after the five rounds of the test were finished. Such, however, was the case, and here the fault could not be laid to the bolting, as that was the same for all the plates.

We cannot wonder that after this the Italians chose the Schneider plates for the *Lepanto*. The contest between all steel and compound armor has been a spirited one. Each type has its advocates who are loath to concede any advantage to the other. At the present time nearly all authorities on the subject admit that the question is still an open one and far from being settled. Nor is its importance so evident, as both types seem to be nearly equal in their ultimate power of resistance to projectiles. They differ principally in the manner in which the energy of the projectile is taken up. The hard steel face of the compound plate offers at first a much greater resistance than the softer steel of the other type, but the latter gives almost a uniform resistance throughout its thickness, or as the expression is, it has more "back-bone."

Now that steel projectiles have been improved to such an extent that they may be fired against either class of armor without breaking up, and with very little deformation, the hard steel face of the compound type has lost much of its usefulness, and the projectile soon reaches the soft wrought-iron back where it meets with comparatively little resistance to penetration. With projectiles of medium or inferior quality, and especially when they are overmatched by the armor, the compound plate is at its best, and the penetration is less than in the all steel; but I do not know of a single instance where a compound plate has kept out a projectile that an all steel one would not, *both plates being in good condition when fired at*. This is the true test of armor, the object of all the development being to keep out the projectile, not to preserve the armor itself. The lack of "back-bone" in the compound armor is shown in its tendency to give back when struck, thus producing the concentric cracks so characteristic of the type and which are never found in the all steel plates. It is a well established and admitted fact that a rigid backing is essential in order to develop the best powers of compound armor. The great objection of the English authorities to steel armor is its liability to through cracks, but it has been abundantly shown that the pieces may be held up to their work by a good system of bolting. In all of the trials between these two classes of armor

in which heavy plates have been used, I think it must be admitted that the all steel plates have shown themselves the better, and in view of the fact that the contest assumes its greatest importance when it is a question of heavy armor, I do not think that it is going too far to say that the United States has chosen wisely in adopting all steel armor for her battle-ships. It is a very significant fact that in the very latest trials held at Portsmouth in 1888, the English authorities have given such great prominence to all steel plates furnished by their own manufacturers [nine out of the eleven plates tested were all steel]; and although no official report has been published as yet, from unofficial sources we learn that a solid steel plate from Cammel showed wonderful resistance with very little cracking. It would seem from this that the English have lost that supreme confidence in the compound type that they formerly held, and are more than willing that their manufacturers should develop the solid steel armor.

Lieutenant Very seems to think that the two classes will gradually approach and finally merge into one another, thus giving armor of all steel, but of varying tenacity, hardness and toughness from the face to the back, the face being of very hard steel and the back of much softer mild steel with great elongation, the whole combining the good points of both classes. Something like this was attempted by Cammel in March, 1884.* He made a plate $10\frac{1}{2}$ inches thick, the face being of hard steel with a tensile strength of 47 tons per square inch, and elongation of 1.5 per cent. and the back of mild steel with 23 tons tenacity and 25 per cent. elongation. For wrought iron used for the same purpose the tenacity is about 17 tons and the elongation 18 per cent. When this plate was attacked by a 10-inch muzzle-loading gun, through cracks were developed. The same thing occurred when Browne & Co. tried a compound plate with a backing of wrought iron having unusual tenacity and elongation. Captain Browne concludes: "That this result seems to show that low tenacity is a necessity for metal in the back of a plate, if it is to be kept from cracking through." "The great power of elongation is, consequently, useless under impact, unless the plate elongates with but little resistance." Undoubtedly both systems are constantly increasing in efficiency, as is shown by late comparisons with wrought iron, as to their resistance to penetration.

* See Browne, p. 90, II.

In October, 1888 tests were made of the Schneider plates for the Swedish armor clad *Göta*.* They were 9.6 inches in thickness and were attacked by a 15 c. m. gun firing a projectile capable of piercing 11.6 inches of iron at the range of the target. Three shots were fired with penetrations of 3.8, 3.4 and 3.7 inches respectively. The plate was reported as practically intact at the end of the trial. With the earlier plates a penetration of nearly 8 inches would have been looked for at each shot.

With their best efforts, however, the manufacturers of naval armor have not been able to keep pace with the gun and projectile. The following is a table showing the heaviest high power guns of different manufacture, coming in after the 100 ton M. L. Armstrong :†

Gun.	Weight, tons.	Projectile, lbs.	Diameter, inches.	M. V. Ft. S.	E. Ft. tons.	Penetration of wrought iron, inches.
Elswick ...	110½	1,800	16.25	2,148	57,580	35.5
Krupp.....	119	2,028	15.75	2,000	56,250	35.4
French.....	71	1,180	14.66	1,955	31,272	27.4
Armstrong..	104	1,799	17.	2,018	50,810	32.3

The rapid fire gun has received a good deal of attention of late and must certainly be considered in determining upon any system of armor. The muzzle velocity, striking energy and penetration of the larger ones are here given:

Gun.	M. V. Ft. S.	E. Ft. tons.	Penetration in wrought iron, inches.
Elswick, 36-pounder.....	1,946	945	7.3
Hotchkiss, 70-pounder.....	1,924	1,797	10.5

In mentioning the ordnance that will be used against armor, the new rifled mortars must not be omitted. † Our own 12-inch rifled mortar fires a projectile weighing 627 pounds with an initial velocity of 1150 f. s. and remaining velocities at 2000 and 10,480 yards of 1003 and 855 f. s. respectively, equal to a perforation of wrought iron of 10.5 and 8.96 inches, assuming normal impact. At five miles the corresponding perforation is 6.6 inches. On account of their cheapness, many of these guns will be used in the future for sea-coast defense, and we see from the above figures that they are more than a match for the deck armor of any war vessels now afloat. The projectile has

* See Information. Series No. VIII., p. 427.

† See McKinlay, p. 313; and Browne, p. 100.

‡ See JOURNAL MIL. S. INS., No. 38, p. 244.

improved along with the gun and at the present time forged steel projectiles, the Holtzer, St. Chamond, Krupp, Whitworth and others seldom break up badly against any but the hardest chilled armor.

In the defense of sea-coast fortifications attacked by armored ships, it is absolutely essential to know exactly what is to be brought against them in the attack. To this end a list of all foreign navies should be furnished to each commander, giving a detailed description of every ship, such that any vessel could be recognized at once, and her armament and armor found at a glance.

In order that the guns of the defense may be properly directed, the exact nature and distribution of the armor must be known.

All armored ships built previous to 1876, are armored with wrought iron. Against such armor it may be laid down as a rule:—"That it is useless to attack with projectiles that have not at least 1000 feet striking velocity for each calibre in thickness of the armor," otherwise only partial penetration will result, which does very little injury to the plate. On the other hand steel or compound armor may be overcome, *in a sustained attack* by guns that are no match for it, and that would be useless against wrought iron of the same thickness. The total striking energy of all the projectiles is nearly the measure of their effect against any hard armor plate, the blow being taken up by the entire mass of the plate, whereas in wrought iron the effect is strictly local. For the penetration in wrought iron, we make use of empirical formulæ. We have Fairbairn's, Maitland's, Inglis' and still others used on the Continent, any one of which will give results sufficiently accurate for all practical purposes, requiring only the striking energy, and constants easily obtained. The rule of thumb, first proposed by Captain Browne, also gives a very close approximation. It is "That the penetration in inches is equal to the velocity in *thousands* feet per second, multiplied by the diameter of the projectile in inches."

All of the formulæ mentioned are for armor piercing projectiles; for common shell, the rule is that they are capable of perforating a thickness of iron equal to one half their diameter, without breaking up. Sufficient data have never been obtained, to make a formula for penetration in hard armor, indeed it is only

* See Meigs and Ingersoll, p. 174.

recently, that is since the great improvement in armor piercing projectiles, that penetration in the true sense has been effected in either steel or compound plates.

It has generally been assumed, in lieu of a better rule, that a compound or a steel plate is equal to one of wrought iron of from $\frac{1}{2}$ to $\frac{1}{4}$ greater thickness. In oblique penetration, it has been found by experiment, that a projectile from a heavy gun cannot bite at a less angle than 30° with the face of the plate. For this kind of penetration, the flat-headed projectile is considered the best form, as it will bite at a less angle than any other, and the ogival headed projectile with an ogive struck with two diameters is better for this purpose than one with a head struck with one and a half diameters. Projectiles almost invariably break up on oblique impact, especially if the plate is more than a match for the gun. As the majority of hits in actual service, either in a naval combat, or in the attack of a fortification by a fleet must be oblique, this is undoubtedly a great point in favor of the armored vessel.

The first armor clad ships built, were of the broadside type, completely covered by thin plates; but soon the increase in thickness necessitated a change in their disposition. It became impossible to afford protection to every part of the ship, and the great weight of armor was concentrated at the water-line and the batteries, where protection was all important. The water-line belt, which at first extended the whole length of the vessel, was made thicker in the middle, in order to thoroughly protect the machinery, and tapered to some distance below the water line.* "The English concentrated their guns in a central casemate, the French protecting their smaller guns in the same manner, but placing the heavy guns in barbettes with larger firing arcs. The Italians have separate protected gun positions." Many vessels built in the different countries of Europe, after the success of our *Monitor*, had their heavy guns protected in turrets. France has steadily adhered to the complete water-line belt, and as the necessary thickness of the belt increased, it was at the expense of the auxiliary batteries, which are often left entirely unprotected. The heavy guns are as widely separated as possible, in heavily armored barbettes with protected ammunition tubes. The *Admiral Baudin*, built in 1878, is an example of this class. She has three barbettes, high above the water,

* See Gen. Inf. Series, No. VIII., p. 83.

with 15.75 inches of steel armor, and a water-line belt of the same 21.65 inches thick. Her secondary battery is unprotected. Knowing the distribution of her armor, a commander could at once decide upon his method of attack. Unless the situation were such that the fire would be long continued, only the heaviest guns should be brought directly against the water-line belt or the barbettes. The lighter ones would be much better employed against the secondary battery, the tops and the crews in the barbettes.

In England compensation was made for the increase of thickness and weight of armor by leaving the ends unarmored, resorting to protective decks and water-tight compartments, thus the vitals of the ship are protected and the curved steel decks serve to keep out direct fire from below the water-line.

The *Inflexible* is an example of this class. She is a turreted ship carrying 17 inches of compound armor on her turrets and 24 inches of sandwich armor over her central citadel. In an action with this ship it would be absolutely useless to attack her citadel with guns not equal to that thickness of two plate, sandwich armor, as the racking effect would be very inconsiderable and partial penetration would do no damage.

The shortened water-line belt, in conjunction with armored or deflective deck for the unarmored ends, has been more or less used in every country except France. The deflective decks may be either curved or plane-sided and are of steel from 2 to 4 inches thick. They both start from a point below the water-line and rise to a height at the centre line sufficient to give room below for machinery, etc. The sides are inclined at such a slight angle with the horizontal as to deflect nearly all direct shots. In many cruisers this protective deck and steel gun-shields constitute the entire armor.

In England, before 1880, the heavy guns were usually concentrated in a well-protected position, either in turrets or in barbettes, with a central citadel. Since that time they have rather followed France in separating the protected-gun positions, the object being that the entire main battery should not be disabled by one well-directed shot. The latter disposition, however, is at great expense in weight of armor.

Of the Italian ships, the *Duilio*, *Dandolo*, *Italia* and *Lepanto* have their guns concentrated in an armored central citadel or barbette. The *Re Umberto*, built in 1888, has her heavy guns separated.

The development of rapid fire-guns and shells charged with high explosives has had a great effect upon the distribution of armor in the latest ships of war.

In a paper presented to the British Parliament in February, 1889, we find the following :

" It was decided, however (by the Board of Admiralty), in view of the great development of high explosives, that in any new designs for barbette ships the proportion of the water-line, protected by the belt of armor, should be greater than the corresponding proportion in the Admiral class, and further, that the armored barbette towers should be carried down to the top of the belt in order that there should be no possibility of the bursting of shells containing large explosive charges under the floors of the barbettes upon which the revolving-gun platforms are carried."

" It was decided that, in the barbette designs, the broadside, from the top of the belt armor to a height of about ten feet above the water, should be protected by armor of moderate thickness."

" One point which received the most careful consideration in relation to all the designs, whether for turret or barbette ships, was the protection proper to be given the guns in the auxiliary armament in view of the development of high explosives and quick firing guns of large calibre."

A thickness of four or five inches of compound armor was considered sufficient for the purposes stated, and the latest ships designed, not only in England, but in France and Italy, have such protection, which will be increased in later designs if any weight can be safely taken from the water-line or other armored parts.

We have followed roughly the development of naval armor through its different stages, from the $4\frac{1}{2}$ -inch plates used on the *Gloire* and *Warrior* to the heaviest steel and compound plates of the largest modern war-ships. It only remains to consider what guns we have for defense in case of an attack by a foreign fleet composed of these powerful vessels. The result of the consideration or investigation of this phase of the subject must be humiliating in the extreme to any true American. Along the entire length of our coasts we have not a single modern, high-power rifle, mounted ready for use. We have only our old heavy smooth bores and a few converted rifles, all of which would be absolutely useless except against the lightest armor-clads, and then only at the very shortest fighting ranges.

The 15 inch S. B., has a muzzle energy of about 9000 ft. tons, and is capable of perforating 10-inch of wrought iron at 1000 yards. The 8-inch converted rifle at the same range can perforate about 8 inches of iron. They may be utilized for secondary

* See Gen. Inf. Series, No. viii., p. 91.

defense, for flanking batteries, for submarine mines, etc.; but even in such cases, they are too clumsy and unwieldy to be very effective, when compared with modern guns that are used for the same purpose.

The proposed heavy guns for sea-coast service are :—*

Gun.	Wt. of Proj. lbs.	M. V. F.S.	M. Energy Ft. Tons.	Thickness of iron in inches can perforate at muzzle.
8 inch	290	1,850	6,880	17.3
10 "	575	1,850	13,642	21.8
12 "	1,400	1,850	23,725	26.2
16 "	2,300	1,850	54,568	34.4

Since the report of the Board on Fortifications from which the above was taken, an 8-inch built up steel rifle has been actually tried, and gave as high as 7333 ft. tons muzzle energy, equal to a perforation of 17.9 inches of wrought iron. In 1888, \$1,500,000 was appropriated for the purchase of rough finished steel forgings, for high-power coast-defense guns of 8, 10, and 12-inch calibre. At the same time a Board of Ordnance and Fortifications was created, with power to contract for at least 50 ten-inch, and 50 twelve-inch steel guns, and 50 twelve-inch cast-iron, steel-hooped B. L. rifled mortars, from private parties, which should fulfill the requirements of the Board. The 10-inch gun must show a power of at least 15,000 ft. tons muzzle energy, and the 12-inch at least 26,000 ft. tons.

Such guns would compare very favorably with the best guns in foreign services. We have now every reason to hope that Congress will at last give us the guns and fortifications so urgently demanded by our unprotected coasts.

* See report of Fortification Board, 1886, p. 64.

THE LIGHT BATTERY IN TIME OF PEACE—WHAT IT IS AND WHAT IT SHOULD BE.

By L. G. B.

IN writing this paper I have in view my experience during the regular tour of duty with the Light Battery. It is not believed to be exceptional and it is thought that most of these remarks are applicable to the whole Light Artillery service.

The drills were as follows: During the season for mounted drills there were battery drill for three hours in the morning and standing gun drill one hour every afternoon. During the winter season the battery was drilled for one hour every morning in the manual of the sabre, and sabre exercise.

It will be observed that the time allotted to these two latter objects is entirely disproportioned to the space occupied by the subjects in the drill book. These drills consequently became very monotonous in a short time. In the case of the winter drills, this monotony was relieved by introducing gymnastic exercises, and a system of broadsword practice.

The battery drill also became very monotonous before the end of the tour. The captain of the battery always retained command at drill, and when he was prevented from attending drill, the battery was divided into two platoons, and drilled by platoon.

The battery did a small amount of marching during the summer manœuvres, and, I understand, did considerably more the summer that I was absent. There was no target practice during the time which I spent with the battery, on account of the want of a range, but it is believed that if solid shot, or shells with a blowing instead of a bursting charge had been used, a range might have been found.

Guard duty was performed in the way usual in light batteries. A guard of two non-commissioned officers and six privates was detailed from day to day, and was under the orders of the battery commander and battery officer of the day, the latter detailed from the lieutenants of the battery.

During one winter season, the officers' school took up a study of the horse, and veterinary surgery, and also the tactics of light artillery.

The object of the above description is to show that the duties performed were generally of a routine character.

Each light battery is declared by the Army Regulations, to be a school of instruction in light artillery for the subalterns of the regiment. For this purpose each is granted an increased number of men, and certain other advantages. The length of the tour of duty is the same as that of the Engineer School of Application, the Artillery School, and the Cavalry and Infantry School, so that there is ample time to learn a great deal about light artillery.

Before deciding what the light artillery instruction should be, we must first see what portions of the present system can be dispensed with.

The first thing would be, to see that all routine duty was well learned and then reduced to a minimum. Drills should continue only so long as is necessary to secure efficiency in that particular direction. There are two other things which deserve attention,—the battery guard and evening stables. As to the first, if we were to try to do guard duty in the hardest possible way, we would probably require each organization to furnish its own guard for its own property and quarters. But as we are not trying to do so, we follow, except in the light batteries, the method prevailing in civil life and elsewhere, of uniting the efforts of all in the same direction. The only reason that I have heard for this exception, is that the battery, being accustomed to furnish its own guard, will then always be ready to take the field. But this reason would equally apply to the other arms of the Service. As a troop of cavalry can take the field without difficulty, there is no reason apparent why a battery should not be able to do the same. Also my experience has been that officers and men will do any sensible thing without much trouble.

The practical working of this system of separate guards was as follows: a sentinel of the post guard was in charge of the quartermaster's and commissary store houses, and the quartermaster's corral during the night; while next to him it required two sentinels day and night, save when the battery was at drill, or at stables, to guard the battery stables and park during the summer, and the battery stables alone in the winter. The post

sentinel had a feeling of responsibility, which kept him from committing many of the irregularities which were common with the battery sentinels. I had inspected the post sentinels every third night, for nearly a year at a previous station, and only on one or two occasions found sentinels not alert. On the other hand, in the light battery, on one occasion, I found a sentinel asleep. At other times in the stalls, ostensibly tying loose horses, and usually sleepy.

It is true that this state of things might have been modified, to a certain extent, by a stricter discipline; but there is nothing which can take the place of the feeling of responsibility, caused by having something to guard. Guard duty was a secondary matter, and will usually be so under this system. The post sentinels had orders concerning enlisted men to enforce, and enforced them in a most thorough way against the artillery. At the same time, the infantry officers and men felt aggrieved, because the artillery was withdrawn from post guard duty, although this was strictly in accordance with the Regulations. The light artillery force is so small, and the batteries are found at such a small number of posts, that the system will usually be strange to any troops with whom it may be called upon to serve. Consequently in the future, as in the past, this system will be the cause of much friction.

Antagonisms arising in peace, are very apt to affect the efficiency of an arm in time of war. In fact, one of the causes given by Prince Hohenlohe for the failure of the artillery in 1866 was a similar antagonism.

If the battery guard were abolished, a great saving of time and labor would be made. Its duties could be done by the stable orderly, and one sentinel of the post guard, as in the cavalry. As the object of a light battery is instruction, and as this instruction cannot be carried on without a specified number of men, the following regulation would be proper: "No details shall be made, which will leave a light battery with less than fifty enlisted men for drill, during the season for mounted drills." This would allow: one 1st sergeant, one stable sergeant, one battery cook, one battery tailor, one battery gardener, and to each section one sergeant, one corporal, and nine privates, not enough for all purposes, but enough for many.

The horses of the light battery are purchased at an age of about five years, and up to that time they have never been

groomed more than once a day. This labor is one which is delegated to boys and hired men on farms; and although usually slighted in this respect, the horse is sound when purchased.

But now a great change comes over the animal. The moment he is accepted and branded "U. S." on his near shoulder, the principal object of his life becomes "to submit to grooming." No matter whether warm, or cold and tender,—with oats, or without oats,—he must still be groomed twenty minutes each morning and evening. The quartermaster's horses alongside, are lucky if they are groomed five minutes a day each; yet they seem to get along just as well.

This was an experience of mine while in the light battery: Drill from 6 to 8.30 A. M. Each driver brushed off his horses before going out. Then 8.30 to 9.10 grooming. The horses stood at the picket line or grazed until 4 P. M. Then they were again groomed. I believe that some of these groomings were superfluous. The proper function of grooming is the removal of loose hair, dirt and vermin. This can all be done at morning stables, and anything further is cruel to the horse. There is no reason for the present practice but tradition.

To discover how to spend the time gained by the shortening of the present drills and the abandonment of battery guard duty and evening stables, we must examine the qualities of a good battery. The first is to shoot well, the second to march well, and the last to drill well.

It will be seen that we have about inverted these requirements in our Service.

It was thought by some that shooting with the rifle could not be a science, and that in war the soldier would always blaze away, expecting to scare if not to hit the enemy. This idea as applied to small arms, has been abandoned by everybody except a few of the older officers of infantry; but it seems to prevail still with respect to artillery. The modern gun, breech mechanism, fuze and projectile, and powder, constitute a delicate combination, requiring great skill in handling, and still it is not thought necessary to allow artillery officers to become skilled in their use. The sight and range-finder are also parts that require experience.

Little attention has been paid to these subjects, except, perhaps, in the machine gun battery of the 1st Artillery, but the

sooner we take them up the better the United States will come out in the next war.

In this connection, it is worthy of notice, that the German artillery was well handled in the war of 1870, except in the use of the shrapnel, and to the poor handling of this projectile, the want of execution, which General Sheridan noticed, has been attributed.

Guns.—The light battery being a part of the standing army should have its own armament, which it should use on occasions of parade and in time of war. But as it is also a battery of instruction, it should have complete units of the various kinds of light artillery which we may be called upon to use in time of war. In the term light artillery, I include all kinds of artillery which are usually moved from place to place by horse power.

Mountain Guns.—The War Department owns a number of Hotchkiss mountain rifles. On one occasion that I know of this gun was served by an infantry detachment commanded by an infantry officer. The latter was the only one of the detachment who knew anything about the gun at the start, and his knowledge was obtained in two drills at West Point. The gun did fair service, but how much better it would have done, if it had been in the hands of a skilled detachment, can readily be imagined. It is respectfully suggested that this gun, or one like it, should have been issued to a light battery at first, and then sent with its skilled detachment to the scene of the outbreak, when needed.

It was proposed, some time ago, to equip one battery as a mountain battery. In this way the 1st Artillery would, in time, have become a fairly efficient light artillery regiment, with one ordinary (3.2 in. guns) light battery, one machine gun battery, and one mountain battery, but there is no reason why each artillery regiment should not become just as efficient in a less time if these guns are only issued to all the light batteries.

Machine and Rapid Fire Guns.—These guns may be divided into two classes: 1st. Those carrying small-arms projectiles. 2d. Those carrying a projectile of greater than small-arms calibre. The War Department has a number of Gatling and Gardner (or Pratt-Whitney) guns representing the first class. Of the second class we have only the Hotchkiss revolving cannon, and most of the latter are not at artillery posts.

On one occasion a Hotchkiss 1.45 inch revolving cannon was

sent in from a Western station. The whole gun was rusty, the feed-trough was bent so that it could not be used until straightened, some of the implements had been lost, the powder had been removed from the cartridge cases and the firing spring mislaid. After arrival, it, together with a Gatling gun, was placed in the vicinity of the flag-staff to ornament the post and furnish occupation to the colored ordnance sergeant, who, during fair weather, cleaned these guns from the time visitors began to arrive until the last visitor had departed.

Field Guns.—There are certain problems connected with field guns which are by no means solved to-day, and on which the opinion of artillery officers, after trial, would be valuable. Among them are the relation between the weight of gun and carriage; the practical limit of aimed fire of the light and heavy guns; the mobility of the heavy guns; the width of tire of the wheel, and many others. It is true that some of these questions concern the Ordnance Department, but perhaps the ordnance officers might be willing to learn something on these subjects.

One or more of the heavy field guns should be in each battery; also one or more of the position and siege guns and howitzers should be accessible to each battery as soon as enough are completed.

Each battery should be supplied with enough saddles to instruct the men in riding and to provide for mounted detachments for one platoon. The saddles, which are a part of the harness, would form part of this number; nearly every man can be taught to be a good rider, and there is nothing that can improve the *morale* of a battery more, than for each man to be a good rider and a good fencer and boxer.

The number of these extra guns should be such that a platoon of each could be made up, at each post where a light battery is serving, and if a whole battery could be made up it would be all the better. At posts like Fort Riley, where there are several batteries, the extra guns could be turned over from one battery to another during the drill and target seasons.

Carriages.—The artillery carriage when limbered should be regarded as a cart or wagon for the transportation of the piece and ammunition from one point to another. We should use all inventions found useful in civil life. One of the most striking defects of the present system is pointed out by Captain Michaelis, U. S. A. "He considered the gun-carriage and

limber as a wagon. * * * It is a wagon with a flexible reach and a rigid pole. Nowhere had he found such another construction. In all his wanderings he had never met a four-wheeler in which these conditions were not exactly reversed. Every wagon he had seen had a rigid reach and a hinged pole."*

Captain Michaelis also has a plan for remedying this defect. And with the defect once recognized, it ought soon to be corrected. In addition, great relief for the wheel-horses would be obtained by hitching the swing team to a double-tree at the end of the pole after the manner prevailing in civil life. The lead team might also be advantageously attached in a similar manner.

The objection to the present system, is that it multiplies the strain on the wheel traces, by the number of pairs. If a trace is broken, or horse disabled, all the pairs in front are disabled. With the proposed system, only the one concerned is disabled. It increases the strain on the shoulders of the wheel and swing pairs. As regards the horses in front of the wheel pair, it has about all of the disadvantages of the abandoned splinter bar.

The objection to the proposed system, is that it adds a slight weight to the end of the pole, but this would be more than compensated for by the fact that if the line of traction passed through the pole, much of the present thrashing of the pole would be prevented.

Furthermore, for route marches, when not in the presence of the enemy, the drivers should be taken off the horses and the team driven with lines. These lines would be of small rope and simple in construction. The drivers could mount in an instant, to meet any emergency that might arise.

At drill, and in the presence of the enemy, the horses should be ridden :

To give the horses more to do at drill.

To keep the team in hand.

To accustom spare drivers to riding, and off horses to being ridden.

Horses.—The great trouble with artillery horses in garrison, is that they are not worked enough. They are fed nearly the full ration of grain, and get fat and lazy. But when they go into the field, they are sometimes called on to do hard work, on a short

* "The Army of Kukuana-land." Journal of the Franklin Inst. for Oct., 1889.

allowance. It would be well to require them to pick their living, for a portion of the time, in garrison, so that they could do so in the field if necessary. They should also be trained to pull, and if so trained it is believed that, with modern improvements in carriages and harness, the limit of weight for nearly all kinds of artillery can be safely raised.

A team of farm-horses now draws a wagon weighing 1200 lbs. and a load weighing from 2000 to 4000 lbs., over rough roads ten miles to market and then trots back with the empty wagon. They do this amount of work every day and have no better care than artillery horses in general.

Let us see now how these ideas could be put in practice. The changes in the drill system can be made by the commanding officers of the batteries, or any superior, and will naturally follow from the other changes. Stables, and the system of guard duty, can be changed from the headquarters of the Army by a general order.

Target practice can be carried on to a much greater extent than now with the present allowance, if shells are filled with a blowing, instead of a bursting charge; in the former case they can be recovered and used again.

In the present system, the ammunition is fired away about as fast as possible, against rocks, and with bursting charges, to get through with it as soon as possible.

The fuzes are generally so bad, that they neutralize many of the effects of care in other directions.

The present allowance is not too small if used with care, and supplied for the proposed equipment. It is:

3-in. guns, 25 standard projectiles per gun, and 50 old pattern projectiles per gun.

3.2-in. gun, 25 standard projectiles per gun.

Hotchkiss B. L. mountain gun, 25 standard projectiles per gun.

Hotchkiss revolving cannon, 100 standard projectiles per gun, or their equivalent in money value if reloaded.

Each machine gun, 2000 ball cartridges or their equivalent in money value if reloaded. As many blank cartridges as necessary.

If economy be sought, the supply of blank cartridges might well be limited. The present method of proceeding is to come into battery at one end of the drill ground, the command "commence firing" is given, bang! bang! go the guns, aimed at nothing, fired at nothing. Then "limber rear," and away they

go to the other end of the drill ground, then "in battery" and bang! bang! again, without any earthly object, except the slight one of accustoming the horses to the firing. This is called drill.

We fired about 100 blank cartridges a day for a comparatively large part of the drill season, each one costing twenty-five cents. A time-shell costs \$1.70, a percussion-shell \$1.95, and a case-shot or shrapnel, \$2.00 for the 3-inch gun. If the Government cannot afford us enough projectiles for practice as things now stand, let it abolish or reduce the allowance of blank cartridges. Out of the cost of ten blank cartridges, we could get two good rounds. This would give us an ample amount.

The War Department has on hand enough Gatling guns, revolving cannon, Gardner guns, and mountain rifles to issue one to each battery. The old form of siege gun could be issued until the new ones come.

All these things can be done if the authorities are willing.

It should not take very long for ten guns, of the other kinds mentioned, to be made and issued.

As to other matters mentioned, it would require the appointment of a board on artillery materiel, composed of artillery officers, and one ordnance officer. I add the latter, because he would possess valuable knowledge, and also his presence would spur the others to their best endeavors.

Although this is a subject of the greatest importance to the artillery, much greater than the system of drill, there has been no uniformity or system about it in the past. Some examples of the resulting crudities are the following:

In the case of our siege artillery, the designers of the guns and carriages have, singularly enough, taken as a limit the weight which the present style of ponton bridges can support, viz.: 7500 pounds for carriage gun and limber; and this notwithstanding the fact that the English have had a limber, carriage and gun weighing about 13,000 pounds for some time. This class of artillery will never be required to move faster or further in a day than infantry; will usually move from place to place by rail, and will always be well supplied.

There is a further fact that there are now in this country two breeds of horses especially adapted to this service,—the Percheron and English draft horses—which can be bought in large numbers. Any of these horses can draw a load of 3500 pounds

without difficulty over ordinary roads. But to be within the limits of safety, I have estimated the load for each horse at 2500 pounds; and with six horses this would give 15,000 pounds. A spare pair would accompany the team.

With the proposed improvements in carriages and harness this system would be practicable, and the advantage of having guns of this weight for use in battle against the artillery and works of the enemy, might counterbalance the disadvantage of having to change some of the plans of our ponton bridges.

Again. I have never seen a broken artillery wheel. I have never heard any man say that he had seen an artillery wheel broken except from the shot of the enemy in action, and from dry rot. Hence I would infer that artillery wheels, battle and dry rot being excepted, are like mules, immortal. It would seem that some of the spare wheels were unnecessary or that we might shave down our wheels a little, especially those of the limber and caissons. Nevertheless, in our new siege carriage for the 5-inch gun the wheels weigh 374 pounds each, making the total weight of the four wheels about 1500 pounds, or nearly one-half the weight of the gun, and one-fifth of the weight of the gun-carriage and limber complete. This wheel has a steel tire 4 inches wide and $\frac{1}{8}$ inches in thickness, weighing about 136 pounds.

The weight which we assign to each artillery horse for the 3-inch gun is just about the same that a family horse has to draw, when it is hitched to a buggy. In the latter case the harness weighs, I should say, not over ten pounds, in the former it is so heavy that strong men are frequently strained in putting it on. When we remember that one pound on a horse's back is about equivalent to ten on wheels we can see that the loss is great. There is no need to multiply examples, the factor of safety is too great.

In the tests of traces made by Colonel Williston, the tensile strength was from 1590 to 5970 pounds, giving for the various parts of the lead-traces a factor of nine and over. The new traces are stronger, so we may assume the new factor of safety to be at least 12. Engineers used to think that this number should generally be 5; but the Brooklyn bridge stands well enough with a factor of safety of 3.

The proposed Board must find out exactly what we want and then by applying well-known principles and mechanical construc-

tions now in every-day use in civil life we will have a system of artillery, symmetrical, modern and effective.

The present Commander-in-Chief of the Army is entitled to the thanks of the artillery for the facilities for the practice of their heavy batteries which he has already secured them. If he can make possible the thorough instruction of the light artillery by giving them the guns and needed facilities, some of which are herein referred to, the debt of gratitude will be doubled.

THE PRACTICAL EDUCATION OF THE SOLDIER.

BY FIRST LIEUT. C. D. PARKHURST, U. S. A.,
FOURTH ARTILLERY.

SO long as armies exist the necessity for military instruction must follow, and the problem is, how best to conduct such instruction as to secure the greatest benefit in a given time.

"In days of old, when knights were bold," the aspirant for military honors did not consider any amount of hard work and exacting service as beneath his dignity. From young boyhood to early manhood he was constantly at work being trained in all that was then considered most essential to his after success. Bodily exercise to strengthen his muscles, horsemanship, feats of arms with all weapons then in vogue, menial service in the care of horses, of armor, of weapons, in camp and at home, were all parts of his daily exercise, and not till he had proved himself worthy by his strength, skill, and dexterity, did he finally graduate from his subordinate position and become the full-fledged knight and soldier.

With our Indian tribes we know that the warrior is trained from earliest infancy. As a boy he learns to ride, to shoot, to hunt, to follow the trail, in short, to do all the many things essential to his success as a warrior, and not till he has proved his worthiness does he finally take his name and rank among the fighting men of his tribe.

In both these types of warriors, so widely separate in every way, we cannot but observe one underlying principle of training—the practical instruction that has been given as contrasted with mere theory. We do not read that the knights of old were celebrated for their erudition as a class. We know that our Indians have no written language. In both cases the practical stands forth as the prominent feature of the training, and it is thought that throughout all ages the practical soldier has been the most successful one.

But we are living in this progressive nineteenth century. Our armies are organized upon a different basis from any

that have gone before. How then shall we instruct our men? How much theory and how much practice shall be imparted in order to produce the most effective soldier? Are we now doing the best that can be done towards such an end; are we making the best possible use of our time; is it possible to so alter, amend, or progress in our methods as to produce better soldiers and thereby better results? It is the purpose of this paper to discuss these points and to try to show wherein our methods are faulty, and wherein great improvements may be made.

All instruction, of whatever kind, is but a means to an end. Whatever we may do, the end to keep in view is the making of a good soldier, a good army—the aggregate of many good soldiers—being what we are striving for. Inasmuch as we have no military class, and as our material must be drawn hap-hazard from those who present themselves to be moulded and trained until they become soldiers, let us examine into the methods generally in vogue and see wherein they fail and wherein they can be improved.

Our elementary instruction consists first in trying to "set up" the man, and in the endeavor to render him subordinate and tractable to orders, thus laying the foundation upon which all subsequent education must rest. Now, at the very beginning, I think we adopt a wrong method. Having laid the foundation improperly, all our subsequent building results badly, and our man never becomes the perfect soldier he should be. In the first place we make the mistake of not taking into proper consideration the quality of the material with which we have to deal. We take men from every avocation in life—men whose muscular development has either been entirely neglected, or only partially brought out by the various trades they have followed before enlisting—and these we expect to form almost at once by the simple and perfunctory routine of the "setting up" exercise and squad drill. Would it not be better to break these men in gradually; to take them first to the gymnasium, free from all constraint, and there teach and train each man individually; develop his neglected muscles, give strength, ease, quickness and confidence to all his motions, gain his confidence and respect, insensibly bring him to the quick and unthinking obedience to orders, and then, and not till then, put him into ranks and begin to teach him to march, to face, to wheel, to become in reality a soldier.

What the new drill books will contain upon this point I cannot, of course, say; but I would have a thorough gymnastic training laid down as the first thing to be taught. Then,—after his muscles are trained so that he can move with ease and quickness,—let him begin his purely military education. This would be easily acquired, and be a fit supplement to his muscular training, and the recruit would soon be ready to take his place in ranks, and to march as steadily as the oldest soldier.

I speak from experience when I say I think the present system nonsensical and absurd. I was put in ranks as a "plebe" at the Military Academy, and left to get along as best I could. Hard work is no name for the torture of muscle that was undergone in the constraint of a tight shell-jacket while being put through the "flying drill," the balance step, double step, etc. Had I been taken in my shirt-sleeves, free from the constraint of ranks, under a competent and kind instructor and taught how to develop my muscles, I would then have been able to learn all that was necessary much easier, much quicker, much better in every way. I would not then have learned to hate all such drill, to go through it perfunctorily when I had to go through it at all, and to keep out of it all I could.

And again I speak from experience, when I say that I think the other system the better one. For now nearly two years it has been my fortune to have used gymnastics as the first "setting up" drill for recruits. Not a recruit during that time has been placed in ranks to be taught the "setting up" exercise. They have been taken just as they came,—green, awkward, loutish, perhaps,—and put first through the gymnasium, and with most beneficial results. Not only did they learn all the things they are supposed to learn, but they learned many others and, most important of all, they acquired strength, ease of movement, an erect and military carriage, and all this without distaste for the exercises that produced these results. Voluntarily, for hours after the regular gymnastic drill was over, the men would be found at work on bars, swing, with clubs, dumb-bells, boxing-gloves, or any of the rest of the apparatus, as a means of pastime or recreation.

Again,—a mistake is made at the very outset of our soldier's career, by detailing him as an assistant cook in the kitchen, before he has learned his military duty. The kitchen must have cooks, but the recruit, if he be worth his salt, has some ambition

to be a soldier and to be in ranks with the rest of his comrades. I would insist therefore, that the recruit be left out of the kitchen until he has learned from observation that the kitchen duties are as much a part of his education as are his manual and marching drills. This would not preclude his detail in turn as daily kitchen police, but it would preclude his detail as a permanent assistant cook. He would learn to be a soldier first and a cook afterward.

The same may be said as to details on extra duty in the quartermaster or commissary departments, or details of a permanent nature at the stables of our mounted organization. Let such details follow and not precede the proper military instruction. Then an organization at inspection need not be entirely demoralized by the presence of a number of undrilled extra-duty men, who are only in ranks for such inspection, and who by their awkwardness and ignorance throw the rest into confusion.

Year after year we find the men being put through elementary drill as the beginning of the season's work. Old soldiers as well as recruits must go through this A B C work at squad drill, company drill, target practice, or whatever it may be, *ad infinitum*, and most decidedly *ad nauseam*. Why cannot we go on and upward each year? Why cannot we use what was learned last season as a stepping stone to something new in this one? We do not have very far to go for our answer. The root of the evil lies in the routine and perfunctoriness of the first instruction, in the too great haste to make old soldiers out of recruits, and the consequent want of knowledge of the rudiments on the part of all. If the recruit were kept as such until he knows his recruit drill thoroughly before being made a full soldier; if he could be given to understand that his success depends upon his ability, and that the more and the quicker he learns, the sooner he will be put in ranks; then he would have an incentive he now has not, and would never have to go back to his rudimentary education. Let him be taught that the possession of his musket is an honor to be sought for. Let him know that when he has taken his place in ranks he will not have to return to recruit duty, but will always progress toward complete knowledge of his duty; then he will always be alive, awake, and full of the desire to excel and progress.

We find him at last with a rifle in his hands, and ready to learn its use. Here a certain amount of theoretical knowledge of a practical kind does not come amiss. This too can best be

given when the man is out of ranks, at ease and quiet in his quarters. He is not to be preached at with high-flown and scientific words that go far over his head and produce no effect upon his brain. If his muscular development has been properly looked after he will find but little trouble or fatigue in handling his rifle. Gradually he may be brought to any degree of proficiency and dexterity that may be desired, but he should not be compelled to hold his piece in some constrained position in the mechanism of the motion while each and every man is being corrected. How well I remember the aches and pains of manual drill. How well the absolute impossibility of holding my piece in some new position while the squad was corrected man by man to take the right one.

Manual drill is but a means to an end, and that end is uniformity. Precision and a certain celerity are doubtless to a certain degree essential. They aid insensibly in discipline, and in the *morale* of the organization, and the men finally come to take great pride in their appearance and excellence in this particular. There is danger, however, of getting the idea that such precision, excellence, and fine appearance, are the end and aim of a soldier's education, whereas, he has but just begun his duties, and has yet much to learn before he can be called upon for hard, common sense and practical work.

There is also another habit which I think very deplorable. In our winter season, at posts where the climate prevents other duties or drills, it is thought essential to the welfare and discipline of the command to practice the men daily at the manual. Day after day, for at least an hour, old soldier as well as recruit must stand up and grind away at the same old thing. Weariness and disgust prevail not only with the men, but with the officers as well. After a certain degree of proficiency has been attained there is absolute retrogression.

As an exercise, doubtless the manual has its value. In the want of proper gymnastic apparatus it may be well to make use of it for a certain time each day; but I believe that a short, sharp drill, not to exceed fifteen minutes in duration,—a drill made as varied as possible,—will do more good than the hours of routine and perfunctory drill now so often seen. The time that is saved can be utilized for other things useful for the soldier to know.

As an exercise, the bayonet drill has its value, and no matter what may be said as to the usefulness of the bayonet, its exercise

doubtless teaches dexterity in the handling of the rifle. But here again, the drill should be short and sharp. At first it is absolute cruelty to force men to hold the rifle at "guard" while movements and new positions are being explained. The instructor need not fear that lack of attention or want of discipline will follow his allowing the point of the bayonet to be dropped to the floor or ground while he explains a new movement. But many through thoughtlessness, hold their men at a "guard," or some yet at a thrust, a lunge, or some other difficult position, until all the pieces are in the correct position, thereby entailing much severe strain, and consequent disgust on the part of all.

The recruit having passed through his squad and manual drill is placed in ranks with his company, ready to learn a full soldier's duty in company and battalion drill. The daily drill, the manual, etc., conduce no doubt to a certain amount of endurance, but they certainly have not hardened him to marching condition. Has he learned to march with a loaded knapsack on his back? Is he in proper training to take the field? Although men when judiciously handled soon harden down to marching condition, even when they start out soft and green, should we not pay more attention to the practical, and less to the ceremonial, part of our education? Should we not drill more per day, working more for practical efficiency and less for show and inspection?

In the days of our Indian troubles there was more practical work. Regiment after regiment was in the field, and on the march, in camp, in Indian fight or skirmish, learned something practical and positive of the grim Art of War. Parades, ceremonies, music and noise, were then thought of little value, and the soldier learned the meaning of field service, hardship and exposure.

Now that for years such service has been but little called for, it seems to me we are losing sight of the practical, and are drilling and working for the purely ornamental and theoretical. True, we now have each year our practice marches and autumn manoeuvres. Doubtless these are and will be of the greatest value, and should be encouraged and developed to the utmost. But it is in garrison that the foundation should be laid for success in the field. The one should be the full supplement and complement of the other. Now, indispensable as company and battalion drills are, they by no means form the whole or even the greater part. Besides marching, the men must be

taught the duties of camp life, and where better can they learn the rudiments of this than in garrison? Tents must be pitched, and pitched properly, in rain, storm, and wind, as well as in calm. The hurry of camp formation, after a long, hot, dusty march, when all are tired and cross, is not the best time for instruction. This instruction need not be made either burdensome, tedious, or long. The idea once caught will be retained and the men all the better fitted for field service, and for placing themselves rapidly and properly under cover when the day's march is over.

Camp must be struck and wagons loaded as well as the reverse. Compact packing and the proper stowing of the load are not learned in a day, and the hurry of breaking camp and preparing for the day's march is not the best time for instruction.

Fascines, gabions, and mantlets, are often needed in actual war. Works of a semi-permanent nature have often to be thrown up. When the emergency arises the knowledge requisite for the construction of such things properly and rapidly should be at hand so that the construction may not be delayed by the necessity for instruction.

One of the most important things of all is a proper fire discipline. We drill, and drill, and drill, until the men are as steady as machines in their various manœuvres, but it is almost always without the noise or confusion of burning powder and its accompanying smoke. The drill is conducted as drill simply, and very rarely are the manœuvres executed as though in face of the enemy. The men do not load and fire, and all is as silent as though powder and lead were never the accompaniments of such manœuvres. The men must be taught the noise and confusion of battle in every way that is possible. Suppose that during our battalion drills the men be taught gradually to hear and stand the noise and smoke of firing without excitement. All successive formations can be used for just such a purpose. The benefit to the men is beyond doubt, and they learn also to obey orders in the noise and smoke as well as when all is silent.

Again. When are our drills ever conducted on ground other than the smooth even parade? Do we ever teach our men the proper use of cover? Do we ever seek out the roughest ground available and teach the men there? Battle-fields have this very undesirable quality, and yet we drill as though we never expect to find anything but smooth, open meadows for our actual fighting.

(To be continued.)

Reprints and Translations.

A SUMMER NIGHT'S DREAM.

Translated from the German

BY CAPTAIN GAWNE, FIRST ROYAL LANCASHIRE REGIMENT.

(Reprinted from the United Service Magazine, London.)

INTRODUCTION BY COLONEL MAURICE, R. A..

PROFESSOR OF MILITARY HISTORY, STAFF COLLEGE, ENGLAND.

This pamphlet, when it appeared shortly before the issue of the new German regulations for drill, excited a great amount of attention in Germany. It has led to a series of answers, some of them written by very able men; and the author has replied to these. On the whole, however, the feeling of most of those who have read the original paper and the replies, is that in point of argument the writer of the present paper has a good deal the best of it. In any case, he gives expression in a more graphic and lively form to certain anxieties which many soldiers of all armies have for some time past entertained as to the present condition of tactical training.

In the second of the three parts into which the paper may be divided, he describes with vivid force certain scenes which he himself witnessed during the 1870 campaign. It has long been known to many of us that the writers of the Prussian Official History by no means told, in regard to that campaign, all that there was to be told. It was not their duty to do more than they did in that respect. We have, however, here certain facts which it is of the greatest importance to us to know, none of which have been told us with equal frankness by any of the numerous writers who have given their personal experiences of modern war. Seeing that, as Lord Wolseley long since declared, it is upon these experiences alone that sound conclusions as to our future mode of fighting can be founded, it is of the greatest importance to us to ascertain as accurately as possible what did happen.

Independently of its tactical interest, this pamphlet throws many side-lights upon circumstances in the German Army little understood beyond its ranks.

From all that I have now heard of what others—whose judgment is decisive—say, I am confirmed in my own conviction that no more important study of the conditions of modern war has been published since the campaigns of 1870.

THE conversation had lasted for a long time. At last Colonel Hallen brought it to an end with these words :

"In short, we suffer from a conflict of principles. As long as that is so, we shall never arrive at a true development of our attack formation. We wish to keep up the discipline of our firing line, and at the same time we wish to fight in dispersed order. We accustom our men to pay the greatest attention to their leaders, and at the same time impress on them the fact that in war they must act for themselves. We try to retain control over the troops and over their fire as long as possible, and at the same time recognize that the mixing of units and confusion are unavoidable. Our desire for discipline and our love of dispersed order pull us in opposite directions. We are involved in a vicious circle, and are groping in the dark because we have no fixed object in view. We are, therefore, content with half measures.

"Two alternatives are before us. The first, to remain true to the old love—that is, to surrender order and discipline in the fight, and cease to accustom the skirmishers to the guidance of the leader. Under this system,

we accustom the infantry to fight in disordered masses. We train the individual to independence and rapid decisions. In all manœuvres, we train the men to think that crowding and the loss of all guidance is unavoidable. In short, we organize disorder. The idea has little that is attractive in it, at least for an old soldier such as I am.

"The other alternative is to give up the attempt to control crowds which have neither discipline, regularity nor leaders. We must, then, altogether forsake the dispersed formation and accept as our principle—cohesion, not dispersion; mass, not individual fighting; separate units, not mobs. Then there will be no need to organize disorder; but there will be a determined repression of disorder.

"I have explained to you before the means by which I believe this goal may be reached. If these means are wrong, others must be tried. If we strive to attain a clearly defined object, the necessary means will soon be found.

"We have now gone so far that we must come to some decision. The choice cannot be difficult. In fact, we have already, although unconsciously, chosen and chosen rightly. Read to any Red Indian the paragraph of our Infantry regulations referring to the education of the skirmisher. It embodies the experiences of the Napoleonic wars on skirmishing. Doubtless the Red Indian would heartily approve of this paragraph, and assure us that his young men could not have better principles for their education as independent warriors. After this, take him to a barrack square or drill ground, and the child of Nature will look about in vain for such independent warriors. He will only see soldiers who dare not leave their places, men who only do what their leader commands.

"In fact, we have already practically, though not willingly, given up the dispersed fight. Yet we are still so confused in our ideas that any one pleading openly for the abolition of the dispersed fight, and the introduction of firing lines in close order, must expect at first to meet with assertions that his views are unsound.

"The present style of fighting is called the 'dispersed but regulated' order. It would be almost impossible to express more clearly the inconsistency of this conflict of principles. Would it not be more truly described as the order 'not dispersed but unregulated.'

"Now, my friend, I have startled you, perhaps irritated you, but—*tu l'as voulu Dandin*. I entered unwillingly on this conversation; but now that I have done so I do not regret it, though you are the only man who could have induced me to speak out.

"You will not think me mad. I can even trust your friendship not to reject at once the views so suddenly and unexpectedly put before you, but even, at my request, to think them over. We will resume the argument some day or other.

"Now I must stop; it's very late, and quite time for us to be in bed. Good night."

So saying, my old friend Col. V. Hallen stood up and shook hands. We had had a long and heated conversation.

I was put out, sulky and perplexed. I could not at once think of the

right thing to say. Silently I gave him my hand, and turned to show him to his room ; but he would not let my hand go, and laughingly added, "Now, think over what I have been saying."

Looking at his honest old face I forgot my annoyance, and said, "Yes, Hallen, you have surprised me. That such a gulf should be fixed between your ideas and mine appears impossible to me. What the devil put such ideas into your head, and why did you never say anything to me about them before this evening ?"

"Oh, I'll tell you all about that some day," answered my friend, with a laugh, adding more seriously, "As to the gulf, it's not such a big one as you imagine."

We parted for the evening, I promising my friend to resume the conversation on an early day, and to show him that I had thought the matter over.

My brain whirled. Perhaps I had taken more wine than was good for me. I was not at all satisfied with myself.

During the entire conversation I had maintained an attitude of hostility towards Hallen's theory, and without going deeply into it, had only uttered short, hostile, and often sarcastic contradictions. Now I found myself alone, I began more and more to admit, that probably I had never heard anything better worth considering, and that some part of what he had said had occurred to me before. What had seemed new and astonishing to me was at all events the result of earnest reflection, and therefore worthy of my best attention. The ideas which had repelled me during our conversation now attracted me irresistibly. This often happens with argumentative people. I thought I might have repressed some of my sharp answers, and could have agreed with many of Hallen's ideas. I felt I had had the worst of it, after all.

Hallen is my oldest and best friend. We were subalterns together in the same regiment. Later on, the usual fate of soldiers separated us ; but we still remained in unbroken sympathy of thought.

After a three years' separation he had come to spend a few days with me. What had we not to talk over and to relate ? In three years a great deal happens among officers of our age. Old soldiers cannot help grumbling. But, besides our grumbles, we had much to discuss. The increase of the army, the new infantry equipment, the repeating rifle, the new musketry instructions, the field exercise, the changes in the drill regulations. No one can say we have rested on our laurels during the last two years, and it is encouraging to see that those in authority are as averse to an apathetic halt as to an incautious rush.

No other subject has, however, for two fanatical infantry soldiers the charm of field tactics ; especially when the two fanatics belong to different army corps. What is your normal attack ? Have you a preparatory and a final stage in your attack ? Do you make a practice of mixing up units ? A thousand such stock questions and ideas were started ; the discussion of them, always raising fresh questions and answers, is as interesting as useful. The infantry staff officer, promoted into another corps, who tried to bring with him the practice of his old corps or his own private methods,

would have a rough time of it at inspections, and would very soon give up the attempt to go against the stream, not without having suffered for his pains. Of course all this is a necessary consequence of the present ferment in tactics.

As usual, we had gone over all this ground in our talk. We had always liked these friendly exchanges of ideas, and, till now, had always talked without reserve. This time, however, to my astonishment, Hallen was keeping something back. Of this, as the day wore on, I became more and more convinced, and, further, that it concerned a subject as to which I had least expected any reserve on his part.

The question of the day is, What influence will the repeating rifle have on our fighting formations; and nearly all the tactical considerations I have mentioned hinge on it. But whenever I approached this subject, I met with no response. Hallen would either deftly parry my remark, or pass it off with a joke, and start some other subject of interest. I knew his skill in that way, but had never experienced it before in our confidential chats.

Formerly, we had had no great differences of opinion with regard to our infantry fighting formation and training. Neither of us had ever been great admirers of the Regulations.

I resolved to discover, at any price, the reason for my friend's reserve, and to make him speak out, not merely because the tactical question was important, but still more in the interest of our friendship.

I succeeded in this. After a pleasant supper, we had come home and enticed by the beautiful warm summer night, sat drinking our wine in the verandah. It is at such times as these that a man opens his heart.

"Hallen," said I, as he again tried to evade the question when it cropped up, "you are not acting honestly by me; you are keeping back something. Why will you not tell me what it is? Even if my views have no value for you, that is no reason why you should keep back yours from me."

"Don't be a fool," answered Hallen. "If there are certain subjects about which I would rather not talk, it is only because my views are too peculiar to suit our usual conversation. I do not want you to say, 'Spare me such crack-brained theories.'"

"I very much doubt your having strange ideas, my dear Hallen; but, even if so, you might tell me what they are. Perhaps I shan't find them very strange, after all. Or," I added, laughingly, "are you going to turn 'author?' I am afraid you are writing a book, and wish to startle me with it when it appears."

"I write a book!"

"Yes, you have the ability; and now I think of it, I only wonder why you have not done so before. You speak like a book, why not write one? When a man begins to think for himself, he generally ends by going to the publisher."

"I do not know if I speak like a book, but I know that I cannot write one; otherwise, I should have done so long ago."

"Didn't I say so? I see that you have had such an idea in your head.

Perhaps you may yet carry it out. And what will be the name of the book?"

"What will the name be? 'The art of hiding Crowds—the Plague of the modern Battle-field;' that title will do," answered Hallen, laughingly.

"Bravo!" shouted I. "Certainly the book will create a sensation. At all events, the title will do so, and the contents also, provided they contain a prescription for the proper prophylactic against the plague."

"You mean, my dear fellow, that the chief duty of a physician is not so much the cure of illnesses as their prevention."

"And have you such a prophylactic against this plague, which we all know and detest?"

"Yes; I think I have."

"Well, out with it."

"It is 'abolition of extended order.'"

"I have another," laughed I. "'Abolition of nerves.'"

"Quite right," said Hallen, still joking. "Your method is good; but it is no medicine, only an effect which will follow upon the use of my medicine. You believe both impossible," he added, "I, on the contrary, seriously believe that these sensitive 'nerves' will, under certain conditions, cease to exist. These conditions are abolition of the crowding together of different units in the fight, and the introduction of close order formations; freeing our fighting tactics from the weaknesses which a false and sentimental humanity has introduced; and the restoration of the 'bloody energy of war,' to quote the late General V. Ollech's words.

"Did you ever hear of Frederick's men having nerves? I think any of his officers who had nerves would very probably have been cashiered on the news reaching the King's ears. And if the officers do not have 'nerves,' neither will the soldiers; that is to say, soldiers fighting in close formation under the eyes of their officers."

"You would not have us return to linear tactics?" I asked, in astonishment.

"Not return, but *advance*," answered Hallen, quietly. "The old linear tactics are dead, but a *Phoenix* may arise from their ashes. Rejuvenated linear tactics, suitable for modern fighting, and consisting of handy single ranks, with no depth of formation."

"But, Hallen, those are not linear tactics."

"Call them what you will. What presents itself to my mind is the regulated mass-fire of lines in close order. In these lines, the 'Zug,' in single rank will form the fire unit."

"Lines in close order!"

"Yes, lines in close order; but flexible lines, well accustomed to manœuvre in the open field. Now, you have made me say so much that you must listen to me patiently," added Hallen, with that friendly earnestness which characterizes him.

I listened with astonishment.

"Have we, at present, the old extended order—I mean that created during the memorable wars of the French Republic and the First Empire, and afterwards introduced into all disciplined armies? No, it exists no longer.

"The extended order was an accompaniment of the close order formation, but the less important of the two for battle. Indispensable as the extended order was, still it was never more than an auxiliary to the close order. The battle was only prepared by the fight in extended order, but not carried out by it. Either the fire of lines, or the bayonet charge of columns, decided the battle. The masses in close order surrounded themselves with skirmishers as with a cloud of smoke. These skirmishers hid from the enemy the movements of the closed bodies. They kept away the mosquito-like fire of the enemy's sharpshooters, and pressing forward up to the enemy's very noses and eyes, they blinded, confused and shook him. Such, was in those days, the task of the skirmishers.

"Only a small portion of the infantry was given up to the skirmishing fight. In France, the skirmishers consisted of a company to the battalion; in Prussia, generally of a sixth to a third of the whole force. The most active and dependable marksmen were picked for this purpose, and specially trained. The work of these marksmen was inseparable from that of the masses in close order, to which all their movements had to be subordinated.

"To-day the so-called 'extended order' rules the infantry battle entirely. The modern fighting-line unites in itself both the old preparatory fire of the skirmishers and the decisive massed fire of the line. It even takes the place of a portion of the shock power of the old columns. It has passed from dependence to command. This decisive, all grasping force dictates the movements of the reserves. These latter are now no more than reinforcements for the fighting line. Their real work only consists in moving up sooner or later into it. The present 'extended order' demands not only portions of the infantry, not merely specially instructed men, but the entire infantry. Formerly, when extension began, by far the larger portion of the troops were retained in close order. In this way you preserved the certainty of having united and concentrated force for the decisive moment. The bodies in close order always gave a rallying point to the skirmishers. The extension was always only for a fixed time, and had a fixed object. As necessity arose, the skirmishers were withdrawn and absorbed again into the masses in close order. Thus, for instance, when the line in close order began to fire, the skirmishers fell into the ranks. They were again thrown out when the enemy had to be followed. And so arose a continual alternation between extension and close order. This alternation has now disappeared. There is now only the extended order, which increases in volume up to the end of the fight. The re-formation, which is practised during peace, appears to be almost impossible in actual fighting. If a man knows where his company is, it is easy for him to reform. When companies and battalions dissolve and intermix with other troops, or what is the individual to reform? Attempts enough were made on our battle-fields to collect the masses of stragglers, but how seldom were they successful. How pitiful was the result of such attempts generally, in comparison with the thousands and thousands of the stragglers who covered the battle-field? Even when officers succeeded in collecting a number of men of different regiments, and in bringing them up again to the front, it aways happened

that as soon as they were again extended under fire, the mob, without union in itself, promptly lost all cohesion.

"Am I not right? Am I painting matters too black? What you, I, and many of our friends know about this was sometimes even worse than I have described. The extension of masses is the evil soil in which the poisonous plant, the men's habit of hiding themselves away, flourishes so luxuriantly, and unfolds its ugly flowers."

"What then were the advantages of the original extended fighting formation?"

"One advantage was that the enemy had only a few men to fire at. This advantage has disappeared. The present thick firing lines give masses to aim at. The second advantage was that each man's shots could be better delivered. Fire was then at short distances. At 100 to 150 paces, our marksmen could choose the proper moment for each shot; when, for instance, one of the enemy's skirmishers exposed himself incautiously, when a bead could be drawn on one of the enemy's leaders. To do this, it was necessary to allow the skirmisher a free hand in firing; otherwise, the best chances would be lost. It was then quite right that he should select the best cover, and so creep up to the enemy. The only limit to his freedom was the rule that he was not to interfere with the fire of the others. The skirmisher was then a really independent warrior. To-day, the fire begins at 600 yards, and sometimes even at greater distances. The skirmisher sees nothing more of the enemy than a line of little clouds of smoke. Can he aim at any individual, or pick off the officers? He can only aim at the mass, and success can only be attained by the fire of the mass, not by that of the individual. If, however, now-a-days, you are so near the enemy as to be able to aim at individuals, this approach signifies either that the battle is already decided, or that it will be decided in a very short time. There cannot possibly, with aimed fire at distances under 250 yards, be a fight of any long duration in extended order. When that time arrives, the only prospect of success lies in a short but intense fire of masses, followed up by the bayonet charge. Again, it often happens that in calm weather the smoke completely envelopes a thick firing line. When that occurs, what becomes of the special advantage of extended order in the more convenient delivery of each separate shot?"

"It is quite proper that now-a-days skirmishers should be to some extent deprived of their former freedom in opening fire, and in using independent firing. The leader endeavors to keep the control of the fire as long as possible in his own hands."

"If, after the order 'Lie down!' has been given, a skirmisher discovers, two paces in front of him, a favorable cover for himself, may he make use of it? No; because, with the present density of the firing-line, he would hinder the fire of the men alongside of him. What then remains distinctive of the old skirmisher? Nothing. Our present skirmisher is something very different from the skirmisher of the original dispersed order. The former was really a man fighting independently; ours is a man fighting in close order.

"The advantages presented by the original dispersed order have been

lost. The only point which our extended order has in common with its predecessor is its irregularity. Formerly we had the irregular order for individuals, and there was a reason for its existence, in its association with the main body in close order; but now we have the irregular order for masses, a thing for which there never has been any justification since disciplined troops first existed."

" You say 'all the advantages of the dispersed order have been lost,' I interposed. " Surely you have forgotten to mention a great advantage—apparently not lost. I refer to the use of cover."

" Quite right," said Hallen. " I should have mentioned that before. Formerly this advantage was a great one, as on the one hand, the individual skirmisher could seek cover for himself within certain limits; on the other, the masses in close order scarcely knew anything about utilizing cover. Neither of these conditions exists to-day. The skirmisher, placed in a dense line, has in reality no more freedom in choice of cover than the man in close order. He may not leave the line either to go forwards or backwards to seek cover, and he can't go to either side on account of his comrades. We have, however, made great progress in discovering cover for formations in close order. The best way of avoiding the effect of the enemy's fire is to lie down, and troops in close order can do this as easily as firing lines. Our company columns are skilled in the art of utilizing natural features of the ground to approach the enemy unseen. Close country, bushes, woods, vineyards, are indeed no longer obstacles to supports. I do not assert that there is not still room for considerable improvement in these matters, but we are on the right road. The formation in close order, which I believe to be the best for the firing line, is " *Züge*"* in single rank and close order, which will fire lying down. What disadvantage has such a formation in the use of cover, in comparison to the present extended order formation, always more out of hand and seldom less dense?"

" You continually speak of the density of the firing line as if this density was one of its constituents," said I; " but you don't always have dense firing lines. As the Regulations say, you can begin the infantry attack or defense with skirmishing lines, and as the battle becomes hotter gradually increase their density."

" I do not dispute," answered my friend, " the value of thin lines of skirmishers where no serious engagement is intended, or where you only wish to throw out a veil either for observation or security from surprise; though in such a case I should prefer using patrols. But if you are going to commence your attack with so thin a firing line as to have five or six paces interval between files, your skirmishers will indeed have smaller losses, but your troops in close order greater losses. The enemy who oppose you with a dense firing line will have, with an equal front, twice or thrice the number of rifles in action. Your reinforcements, on their way up, will be insufficiently protected by the firing line, and will be annihilated. You will not, therefore, lessen your losses by such a course, and this great extension of the firing line will render fire discipline difficult from the outset. The

* There is no exact English equivalent. A "Zug" is one-third of a company.

worst of such an attack would be that 'crowding' would become the rule, the mixing of units a system, and the 'mob'—the deadliest enemy to leadership, and the greatest friend of skulkers—would be permanently established and habitual."

"I have no liking for such business as this; besides, old man, you know, you yourself do not care for this organized disorder."

"Finally, the object of such an attack is to reach the deadliest range with as dense a firing line as possible. Why is it," continued Hallen, "since we enjoy none of the benefits originally introduced by the dispersed fight, that we still remain faithful to it and its defects?"

"It seems," I replied, "as if your chief objection was to the name 'extended or dispersed order.' I quite agree that it is no longer a good fighting formation for skirmishers. Remember the musketry regulations recommend the keeping together of 'Züge,' in the firing-line, and tacticians wish now to have always the section or half-section regarded as the 'fire unit.'"

"You mean that the whole matter is a mere question of splitting hairs, and that after all we only call the same thing by different names?" asked my friend, in his usual quiet way. "Now you astonish me. I thought to meet with the strongest opposition, and you tell me there is nothing new in what I say. According to the tactical views generally accepted, you can only hope for success by adopting the extended order when under hot fire. I, on the contrary, say you must use close order. Is there really no difference between the two?"

"Certainly, there is a tremendous difference," said I, dryly.

"I do not wish to be misunderstood in my use of the word 'close order,' which seems to me the key-word of our future fighting formation. I do not wish to use columns, as we did till very lately, against the modern rapid fire. Neither have I any wish to encounter the fire of an enemy by taking cover, with the old line. The old line was too clumsy to utilize ground, and too proud to lie down. My close order system is to have grafted upon it all the artifices for gaining cover which we have learnt from skirmishing. These must be unceasingly perfected. That is, in fact, the great service which skirmishing has rendered to the development of tactics."

"Excuse my interrupting you. But you say our skirmisher is a man fighting in mass formation. That flatly contradicts everything on the subject in the Regulations and also the views of our most distinguished writers on tactics. Even if the influence of the leader at point blank ranges has often no effect on the mass of individuals, and if success depends solely on what the firing line may itself resolve to do, still the man is not fighting in mass. He must be taught to act independently, or when the time comes he will be found wanting."

"Yes," answered my friend, seriously. "I know that accepted theories, and the views of those in authority are against me and this fact has caused me many a sad hour. I agree that there are times when the best disciplined troops get out of hand, but I cannot agree that it is impossible to overcome such moments of weakness, if the leaders only do their duty thoroughly."

"When such a fit of madness seizes the firing line, where, I ask, is the leader's whistle? and if he has fallen, where is his successor's? and if even he also has bitten the dust, where are the sergeants and section leaders? Where again, I ask, are the leaders of the companies on either side of the company in question? They cannot all be killed, or so indifferent to their duty as to allow wild shooting in their immediate neighborhood. If there are men who are stupid enough not to pay attention to the repeated shrill whistling, and to go on firing, what are the Zug leaders about if they do not knock the rifles out of the hands of such men? Are there not everywhere brave men who will prevent such conduct on the part of timid comrades? Finally, where is the officer's sword, which, when other means fail, must enforce the necessary prompt obedience?

"I believe a thorough fire-control to be such that it can insure the cessation of fire, necessary to allow smoke to clear away, to keep the men cool and to allow of their hearing orders whether to resume the firing or to advance. We have now the means of permanently creating such a control, if only men are strictly trained to it.

"The regulations and views in opposition to me are founded on the experiences of the last war, where the means of controlling fire were insufficient, and ideas on the subject were less clear than they now are. At that time that invaluable aid to a real fire-control—the whistle—had not yet been introduced. The order, the signal and call of the leader perished in the unsuspected severity of the din of the firing line. I once shouted with all my might in the ear of a man in the firing line alongside of me without making myself understood. The man was to advance a pace, at a moment when he had the muzzle of his rifle dangerously close to a comrade's ear. As neither words nor gestures availed, I finally dragged him forward by the collar.

"As it was impossible to insure pauses in the fire, every shot increased the general confusion and the smoke. If an officer sprang forward, at most the two or three men in his immediate neighborhood followed him. The others saw and heard nothing, and continued firing. And so the poor lieutenant and his few trusty followers had shamefacedly to fall back, or endure a fire from both sides. More often than not, the firing line consisted of a mixture of men from many different regiments. I have even seen men with yellow and red shoulder straps* mixed up together in the same firing line. In such a case, the leader does not know what men he commands: the men, whom they are to obey. Certainly the present means of enforcing fire discipline are most satisfactory!

"A way out of the difficulty, which arises from the mixing up of firing lines, may be seen at peace manœuvres. It consists in distributing the men afresh among the leaders actually present. This would be impracticable under a hot fire. Even if, under exceptionally favorable circumstances, such a process were carried out, it seems extremely doubtful if it would be thoroughly successful. A strange leader will not have the same influence over the men as the officer they know.

* This implies a mixture of men of different corps..

"Is, then, the retention of dispersed order tactics, with its inevitable admixture of units, desirable? If so, people are justified in thinking that a thorough fire-control is impossible. I contend that, under certain conditions, a permanent fire-control is possible. These conditions are: the firing line to consist of *Züge* in single rank, the strength of the *Zug* being not greater than fifty men. The *Zug* must be taught always to close in to the centre so as to make mixing impossible. You cannot crowd into a closed *Zug*. Finally, when a leader falls, his place must be instantly taken by a successor. I have thought out this idea thoroughly, and can find no flaw in it.

"The assertion that volleys are impossible under severe fire may be dealt with similarly. This assertion was in every one's mouth after the last war, and is still frequently heard. Certainly volleys were impossible in the French War. But why? Because the noise of the firing line over-powered the command to fire a volley. One could have known that beforehand. Even with muzzle-loaders it was held that a line of skirmishers could not fire volleys. When the line advanced to fire volleys, the skirmishers were withdrawn, to prevent the noise of their fire spoiling the volleys. It was after the introduction of the so-called 'small volleys' during peace time, *i. e.*, before the last war, that volleys in the firing line were called for. Volleys are only possible when their use is universal; then they are more easily executed, even under heavy fire, than is the recent 'stratified fire,' the name I give to your independent firing with a fixed number of cartridges. I think volleys should always be by sections, even when the company is in two ranks.

"You can only fix the number of rounds to be fired independently when a pause in firing occurs. But, giving such a pause, it is possible that the old words of command, 'Present,' 'Fire,' might produce a steadier and more certain fire than the order, 'Two rounds independent firing.' Who will answer for a man, in the heat of action, not using more than two cartridges? Can you at such times watch each individual? When the number of cartridges is limited and the fire exceeds the proper limits, then the leader's whistle must be used to obtain a fresh fire pause.

"Independent fire must not be allowed for any length of time without fire pauses, or it will lead to an unsteady losing of ammunition. Why, therefore, name the number of cartridges to be fired? It is an old military maxim that no order should be given, of which the execution is doubtful or cannot be controlled. If volleys are not to be used I would only give the word 'Independent fire,' and insure pauses by the use of the whistle. The new fire regulations have, in fact, done away with the firing of the number of cartridges for independent fire.

"It is an error to suppose that independent fire causes more injury to the enemy than volleys. That fire is the most fatal in battle which is most quietly delivered and is least obscured by smoke; that fire is the volley."

"What," I cried, "after educating our men with the greatest trouble and labor up to a standard of individual independence, which excites the envy of other armies, will you again make them the machines they were in past centuries?"

"Machines! yes," said Hallen, after a little reflection, but with much emphasis. "If Frederick's grenadiers were machines, I should like to have such machines, which, come what might, would, like a machine, work on as long as there was steam in the boiler. Such machines continued firing even though half of them lay bleeding and dead on the ground. Oh, my friend, would that we could only again attain the fire discipline which then excited the admiration of the world and was the terror of our enemy.

"But," continued he, "universal service gives us now a better metal than the iron of which Frederick's warriors were composed. The careful attention to the individual, which you just now mentioned, may convert this metal into the best steel. It will make the machine more flexible, omnipotent, and perfect. I mean we are not to neglect the individual education of the soldier. We are not to take less trouble in awakening and strengthening the thinking power of the man. Neither should we omit to educate him in that independent action which our company training gives the man in patrol and outpost duties, in skirmishing, and in shooting. We need patrol leaders, and we also must have a great number of privates capable of replacing in war time, and especially in battle, the corporals and non-commissioned officers who fall.

"In reconnaissance, on outpost duty, in skirmishes between small bodies of troops, in close or wooded country, the real dispersed fight will still occur. But on the drill-ground or at manœuvres where the fight is practised, not of patrols, or of companies, but of large bodies of troops, there should be nothing heard of individual independence and of individual fighting. Any attempt to go outside the limits of the common task should be sternly repressed. The units must be held together with inexorable firmness: and, having got rid of the false humanity which has crept unnoticed into our style of war, we shall then erect on the foundation of our incomparable discipline, luckily still unshaken, a fire discipline unattainable under the present conditions."

"What do you mean by the 'abolition of false humanity' in our style of war?" I asked. "Your ideas are so strange to-day, that perhaps you would like to reintroduce the stick and running the gauntlet?"

"Do not misunderstand me," answered Hallen, calmly. "Frederick's rough iron could only be kept in a good condition by severe means, which are not applicable to better materials. Now-a-days the sense of honor nobly replaces the stick. I would change none of our punishments. I should, however, like a little less dry-nursing of the ranks. The false humanity of which I speak is less common in peace than in war. To make my meaning clear I will give you two extracts, written by our great Scharnhorst, even before 1806. I take them from Von Der Goltz's interesting memoir, *Rossbach und Jena*. I can quote them by heart, so often have I repeated them to myself. The first is: 'Whatever method you may take to raise and kindle courage, courage should always be put in the first place; the brave men must be distinguished on every occasion, and any ambiguous conduct must be covered with shame. Failing these requirements, it will be vain to expect any great deed of arms in this age; and, further, there will be danger of creating nervousness and want of courage. The

moral attributes are never at rest; they fall as soon as they cease to rise.'

"Now I think we are not wanting in rewards for courage and distinguished conduct in the field; but how about the attention paid to dealing with doubtful conduct and the punishment of cowardice? The second extract from Scharnhorst reads: 'Of late, punishments in most armies have taken a peculiar turn. If a soldier quarrels with a comrade, a peasant, or clerk, he is punished severely, but we overlook his throwing away his arms after a defeat or leaving the battle-field before his comrades, and the like.' What officer, who had a company in the last war, does not feel the point of these lines come home to him? Certainly we did not reach the stage of throwing away arms after a defeat, but, on the other hand, how many cases there were of men leaving the fight before their comrades! These men would press themselves into a furrow or behind a bush, lay down their arms and knapsack, and wait in security till the fight was over. Which should be punished most severely—the throwing away arms, when all is lost and fear benumbs the limbs, or the sneaking away and laying down arms while comrades are advancing victoriously?

"Some time ago I heard a story, which I must quote at length, not because it is singular, but because it is typical. A boy officer is on outpost duty before a French fortress with his half Zug. He hears a sharp musketry fire in his front, and resolves to advance his picket to the edge of the wood before him, as he will then be able to see some distance. On the way a sergeant, an old one-year volunteer, asks permission to go back and get his great coat, which he has forgotten. The request is refused. The little picket holds a pit in a brickfield, and is opposed by a line of skirmishers, firing vigorously, but too far off for the needle-guns to be used in reply. The enemy perceives and fires at the picket. The young officer forbids his men to fire, and instructs them to advance to within 600 paces of the enemy. He places himself in front of his half Zug, calls out, 'Double, march!' and runs as quickly as he can to the place whence he intends opening fire. Who can describe his horror-stricken amazement when, on arriving, he sees that but three men have followed him. Shame and anger strive within him. If a superior has seen this! There is nothing for it but to return and bring up his half Zug. Then the men tell him that the sergeant had kept them back, saying he was a sergeant and was not going to advance. The men were to stop where they were, and he would take the responsibility.

"What was done to this sergeant? From that time forward, whenever there appeared to be any likelihood of fighting, he was sent to the baggage guard, and when he was before Paris he was given work in the kitchen. All this cannot have been pleasant to him. The company would not endure the shame of bringing a non-commissioned officer before a court-martial on a charge of cowardice. No; it preferred to bear the secret shame of leaving such a non-commissioned officer unpunished, though he was a bad example for weak men, and caused rage to strong men.

"That is one of many similar cases. There lies the weakness of modern times. I call it false humanity."

"I must tell you," said I, "I think it extremely doubtful whether much can be gained by punishment in such a case. How is it possible, in the course of a modern fight, to know which of your men have really 'skulked'? How can you decide whether the stragglers have remained behind from cowardice or, having been separated from their unit by no fault of their own, have remained behind from not knowing what to do?"

"You could have given yet another reason," interposed my friend. "If things happen in the next war as in the last, the number of the stragglers will be so great as to render their punishment impossible."

"According to the official history, at Gravelotte, on the 18th of August, forty-three companies of different regiments were at one and the same time in the Auberge of St. Hubert. You have seen the farm-house, and know the building is scarcely large enough to contain a single company on war strength, especially when you remember that the low garden was commanded from Moskow farm—and under a heavy fire. Forty-three companies are more than 10,000 men. Where were the 9800 men who had no room? This is another typical instance. No one wishes to reproach these troops; the blame rests on our style of fighting.

"So long as we retain this style, it is useless to contend against the crowding together of masses. Of course, in bygone days, there were men who had no leader, but only when troops had been broken, which meant that the game was over for them. But now this epidemic of withdrawing from the battle begins with the game, and spreading with pestilential rapidity, rages over the battle-field like a fever. The private must have some sense of duty and some courage; yes, even heroic steadfastness—not to follow the tempting example of others—to withstand the charm which every tree, every furrow, every ditch has for him, when he knows he can gain security without risk of punishment. It says much for the sterling stuff in our men that we still have so many heroes.

"When fighting in close order with his own comrades and his own leaders, the soldier will keep his place in the hour of danger without being a hero. Here the weak are supported by the strong; here the power of discipline, the influence of the strict drills in peace time, and the authority of the leader prevail.

"In dispersion it is difficult to be steadfast, in close order it is difficult to be weak. Under the leader's influence, the example of the strong impels the whole. Among the leaderless, the example of the confused and the cowards has the upper hand.

"It is not, of course, impossible for individuals to withdraw from the fight, even when in close formations. The leader cannot always have time to inquire whether all who fall are actually wounded. But to avoid the common danger under such circumstances, and in such a manner, argues a grave degree of insubordination. A man capable of such conduct should be punished with the utmost severity. There will not be many of them, especially when they know that, if caught, no mercy will be shown.

"'The dispersed fight encourages natural cowardice, which, to say truth, is to be found in us all,' wrote a thoughtful man before Jena. He was right;

still, as we were beaten in 1806, they said he was wrong. Would one still say that to day?"

"Do you consider it possible to maintain close order under a heavy fire?" I asked.

"Certainly," answered Hallen. "Have not Prussian lines, two miles in length, held together and closed up till two-thirds of their number lay on the ground. A well-seasoned company will certainly not fall to pieces till its fighting power is completely shattered. In the moment of danger, a well-disciplined company rather inclines to close up than to disperse. The continual drills in dispersed order now diametrically oppose this inclination. Cease to skirmish in large bodies; teach the soldier to close up at all drills. Call to assistance the habits of discipline and training, which have already been so extraordinarily successful in smaller matters. There will then be no reason to doubt that close order will be maintained under any circumstances, especially in small detachments, which will easily escape the enemy's fire by utilizing the natural features of the ground.

"But many will cry out, 'What losses this will cause!' I know you will have no quarrel with me on this score. I will therefore only make three brief remarks on this point.

"1st. Züge in close order and single rank really offer no better target than clouds of skirmishers.

"2d. That formation will lose least in a fight which can do most injury to the enemy.

"3d. An army which either suffers from or is not quite recovered from the malady of fearing losses must wage no war, for war is pitiless, and regards not the life of man.

"Our national strength does not lie in dispersion, where each man fights for himself. Whenever we have made our mark in history, discipline and fidelity were the characteristics of the German soldier. Though our soldier is accustomed in peace to careful drill, strict discipline, and unconditional obedience, in battle he is confused by disorder, and by the withdrawal of his accustomed leaders. He will do anything which duty and obedience may demand from him if under the influence of his company officer. He will then, with quiet enthusiasm, follow him through danger and fatigue to certain death. But in a crowd he loses his head quickly, and forgets what has been so carefully taught him during peace.

"It is not so with soldiers of the Latin races. Among them, the individual has more self-consciousness and a greater tendency to act for himself. He does not regard his officer as a demigod, he likes to feel himself untrammelled and without a master. Even in the last century, it was recognized that 'the French are most dangerous when in disorder' (*in der Unordnung am gefährlichsten sind*).

"What reason have we for renouncing the strong points in our characteristic style of fighting, and for competing with our Western neighbors in a style for which they are in every way more fitted? Let us leave the *debandade* to its discoverers, and return to the old close formation and to order. Do not refuse to our men what their dependent natures require at the critical moment, viz., the eye and voice of their officers. They will then

show themselves true men when the time comes, not less true than Frederick's Prussians, of whom even Napoleon said they were 'the best soldiers history had known.'"

"But Napoleon certainly did not believe in their mode of fighting being the best," I interposed. "Do you expect your close-order formations to fight advantageously in cramped or wooded country? I doubt it."

"As I have already said, we are no beginners in the art of skilfully moving detachments in close order, either in the open or in close country. This art can and must be still further perfected. Then we shall be able to fight advantageously in any sort of country. By close order, I do not mean any rigid adherence to the letter of the word. For of course you must turn natural obstacles, not run your head against them. My close order will open the ranks when necessary, but close them again when the necessity is passed.

"The temporary opening of the ranks is not the dispersed fight. If troops who know no other style of fighting than close order come under fire while the ranks are opened, as soon as the ground allows of it they will strive to again form single rank sections in close order; and this is exactly what I want. It is precisely in cramped country, that you most need cohesion and dash, since here all the advantages are on the side of the determined attack. Nowhere is extended order, when constantly maintained, more unsuitable and dangerous than in such country.

"Cavalry is certainly a close-order arm, and exactly because it is so it must possess in a high degree the faculty of dispersing temporarily and rallying quickly. If its education is defective in this respect, then it remains dependent on the nature of the country, and can only attack on plains. But if it possesses this faculty to perfection, then even intricate country is no obstacle. It can then rival Frederick's squadrons, who at Hohen-Friedburg crossed the Striegauer River in the face of hostile cavalry, and then, to the astonishment of the enemy, forming into line, gained a brilliant victory. Thirty-one of these squadrons again crossed at Zorndorf the difficult Zabern Bottom, on which the Russian right flank rested; then, forming under fire, they rode down the whole of the enemy's right wing. You will find much that is valuable on this point in Hohenlohe's *Cavalry Letters*.

"The same acute observer, who uttered the drastic words "skirmishing encourages our inborn cowardice," wrote before 1806 a memoir against the introduction of the dispersed fight into the infantry of the line. But of course you know that there is an excerpt from this memoir in *Rosbach und Jena*.

"This memoir says, that even in cramped or wooded country there is no necessity for skirmishing. A battalion advancing through bush and forest must of course open its ranks, and if necessary, let the men march singly. But that is not skirmishing. The spirit of the attack in close order remains still in the battalion. When it meets a line of skirmishers, of whose work it knows nothing, it advances rapidly and most likely beats the enemy thoroughly. Then comes a paragraph to this effect:

"A battalion, however, which has tasted the delights of hiding in ditches

and holes, and thence bravely loosing off its sixty cartridges, will never miss the opportunity of renewing this pleasant experience. It will, whenever a natural obstacle presents itself, leave the ranks instead of advancing, creep into every hole and corner, and bravely fire away, appeasing its military conscience by sound and smoke, and leaving the further attack to others. There may be exceptions, but whoever denies the truth of these pictures either knows nothing of war and human nature, or is governed by prejudice."

"The author of this memoir was no prophet. The Prussians were beaten but not, as it is generally stated, because they could not skirmish. They were beaten because their military and political indecision was pitted against Napoleon's war genius; because of the disjointed way in which they brought their forces into the battle and allowed them to be beaten piecemeal, and, finally, because they were unable to do what the writer of the memoir took for granted, viz., to open ranks when advancing through cramped and wooded country while preserving the spirit of close order. We could, in fact, only fight in the plain.

"If at Jena, Prussian or Saxon battalions had at once penetrated the Isserstadts forests and expelled the enemy's skirmishers, the French centre at Vierzehnheiligen, which was weak and exposed, would have been in an awkward position and might have suffered defeat. But we did not know what to do with a wood. We let the enemy have it. He then, collecting sufficient numbers there, rolled up the flank of our line which had successfully withstood all frontal attacks. We stood perplexed before the villages of Vierzehnheiligen and Hassenhausen after we had driven the enemy into and behind them, and were in a position to attack with a probability of success. But the storm of a village was something unheard of at this time, and so we remained firing, undecidedly, in front of them till our front was shot to pieces and a flank attack rolled us up. Had we really known what that acute writer considered the true method of fighting in inclosed country; if we had not avoided woods and villages, though the day might not have been won, yet the brave troops who withstood the frontal attack till every second man was *hors de combat* would have caused the fame of the battle-fields of Jena and Auerstadt to belong to the army and tactics of Frederick.

"If I am not mistaken, it is the Prince de Ligne who compares line tactics to a porcelain vase, which no sooner comes in contact with any object than it shatters. Such were line tactics in that year of misfortune 1806. But the comparison to the porcelain vase is not applicable to the fighting tactics of Frederick's troops. Those troops did not fear either wood or hedge fighting, when they drove the enemy's light troops out of their hiding places into the vineyards of Lobositz, or when they opened their ranks to storm the village of Leuthen and then made a fresh attack on the position behind. Further, we find them in Hochkirch, stubbornly defending the church-yard wall. If, instead of shelving this method of fighting, we had developed farther the use of cover in the field, we should have escaped the general use of extended order, and should have been farther advanced than we are, and I should not have had to inflict on you this long talk about the dispersed fight. The rejuvenated line tactics, which I

believe to be the coming tactics, will only differ from those buried at Jena in resembling india rubber rather than porcelain. They will not prove brittle and crumbling when confronted with natural obstacles, but will elastically accommodate themselves to the ground. This new style of fighting will be simple, flexible, capable of extension, but infrangible, assuming any shape at will, but always returning to its original form. The task of future fire tactics will be to unite the old close order and strict fire discipline with the modern art of utilizing cover. The parts played by villages and woods in the fight will then be reduced to their proper dimensions. In the present century, they have been as much depreciated as overvalued. Formerly, we Prussians anxiously avoided them; now, in the dispersed fight, we fly to them. The tactics of the future will be free from such extremes. They will neither fear nor seek wood or village.

In the late war, at the first whiz of the bullets, an unnatural, almost a suicidal mania, seized our well-ordered troops. They plunged into either wood or village, and there the units, rapidly dissolving, became mixed. I say suicidal—for them as a whole—but there was much individual self-preservation in such conduct.

"Why should disciplined troops prefer village fighting to fighting in the open? Even the most irregular troops, who cannot dispute the field with Regulars, can confront the best infantry in the world in house fighting, for here the advantages secured by superior leadership and training cannot have full play. Here the fight returns to its primary conditions, and every man feeling himself uncontrolled, and with passions unfettered, is capable of the grossest brutality. The decisive blow of the higher commander can only be delivered outside villages. Experience has, therefore, taught us that the ultimate result of street-fighting generally depends on the issue of the battle outside the village.

"Frederick the Great most strictly forbade placing men in houses, considering their use in this way as a cause of disaster. His theory has been laughed at during the period of dispersed fight tactics. People could see no harm in confusion; no objection to allowing every man to fight independently. They shut their eyes to the risk of shutting up troops in a village which, when lost, gave the enemy a crowd of unwounded prisoners. Not the desire for order and unity, but the immense searching effect of modern artillery fire on villages and houses, has lately led to the conviction that, as a rule, houses cannot be regarded as desirable cover. The tactician of the future, as, I think, will agree in the great king's prohibition, but in a modified form. He will allow houses to be garrisoned in certain cases, but never at the option of private soldiers. This does not at all imply that villages will not continue to be of great value to the defense; their value will not lie in the shelter they give a garrison, but in the excellent cover they will give to troops posted behind them. Villages always give good cover for movements of troops. Villages will, therefore, still be included in the line of defense, not with a view to occupying them, but rather in order to use them as cover for the supports and reserves. The firing line will either be placed in the encircling line of gardens, or, better still, in shelter trenches close in front and on the flanks.

"In the attack on a village, care should be taken after driving the enemy out of the outskirts, to concentrate all available forces on its flanks, and so bring about its fall. It is a grave mistake when troops have become disordered by the fight for the outskirts, to allow them, while so disordered, to enter a village in scattered bodies. Only a small force, kept well in hand; should be sent into the village. A house-to-house fight can generally be avoided by a thorough artillery preparation, and by advancing quickly on the flanks."

"I quite agree with you," I said; "but, nevertheless, cases occur where a house-to-house fight is unavoidable, as at Bazeilles."

"Yes," answered Hallen. "Bazeilles is an exceptional case. No fight took place for the outskirts of the village, the two forces met inside the place, and as neither would give way, a street fight was inevitable. Even so, the gradual entanglement of more than sixteen battalions of the Saxon and 1st Bavarian Corps might well have been avoided. Officers and troops educated in my tactics would avoid this."

"The decision of this fight should not have been sought in the village itself. The street fighting would have been decided instantly in favor of the Germans, if the heights north of Bazeilles and west of La Moncelle had been taken. Unluckily this did not happen till the fight had been going on for seven hours, in and around Bazeilles and La Moncelle, and had swallowed up the greater part of the 1st Bavarian Corps."

"Even before 7 A. M., weak detachments from the Saxon left wing had gained possession of some houses close to these heights, and for hours, without assistance, heroically held possession of them against the full force of Lacretelle's division. It was not, however, till 11 o'clock that detachments of the Bavarian right, the Saxon left, and of the reserve, accidentally working together, established themselves on the heights. Then the resistance of the French in Bazeilles at once collapsed. Had the 1st Bavarian Corps resisted the attraction of the village, and directed its chief efforts to the capture of these heights, the dreadful struggle would have been shortened, and the greater part of the infantry of the corps would have been spared the effect produced by it."

"No one wishes to reproach the veteran Bavarian Corps, or its able leader, for having acted in the spirit of the age. I blame only the system of tactics."

"You allow then," I said, "that cases may occur where a street fight is unavoidable. Will your infantry fight in close order, even then?"

"If houses have to be occupied, of course you cannot do that in close order," answered Hallen, quietly; "but it does not follow that every house you hold should be crammed with soldiers. It is enough to occupy the houses which command the streets and gardens; and for such work a few picked men are better than a crowd, whose heads would soon be turned by a bad example. All troops not garrisoning houses, but holding hedges and walls, those in reserve, or those who are to make counter attacks in the streets and gardens, must be in close order. Of course they will, from time to time, detach skirmishers when necessary. Does it follow that because it may once in a way be necessary to place a small portion of in-

fantry by themselves in houses, the entire infantry must therefore necessarily and always fight in dispersed order and in crowds? I have no fear that troops, educated as I wish to see them, will prove inferior to others in street fighting; they will, at all events, strive harder to win and skulk less.

"With respect to woods: they must cease to be 'filters into which entire brigades are poured,' and dropped out in little driblets on the other side. The unfortunate experience of the last war has caused the fact to be generally recognized that men must be kept together in woods; and if the enemy be met there, he must be charged at all costs. Of what use were the men who were strewn among the thickets of a dense French forest? When the enemy charged along all the roads, paths, and open places, our men fell into his hands without striking a blow. In open woods, with the high and bare trunks so common in our own country, of course the advance must take the form of a firing line, but it should not consist of skirmishers. Even in the most open woods, except in roads and glades, you can seldom see farther than about a hundred yards. The encounters take place therefore at murderously close distances. All depends here in being the first to attack, using magazine volleys and the bayonet. This is the proper place for united action. Therefore do not advance in dispersed order, but in single rank Züge in close order, opening files from time to time.

"The attack must often place a particular value on woods, as giving the means of approaching the enemy's position under cover. If woods are not to play the mischievous rôle of filters, we must understand the art of leading, with all due precautions, large bodies of troops in close order through any description of wood, and of deploying them under cover at the further edge without difficulty. Then at the required moment they can move out united, and commence the attack with a closed front. Such skill can only be acquired by much practice. It will be a new force added to the fight in close order."

"And how will you work in mountains?" I asked.

"In mountains my single rank Züge will be able to go wherever the modern cloud of skirmishers can. Where, however, only individuals can move, any fight must necessarily be a sort of outpost skirmish, and the education required for this work can only be learnt in the field and on the ranges, not on the drill-ground. Such fighting, being a series of duels, calls for an independence quite different from that of each man in a crowd fighting on his own account. The latter style is hurtful, and to be avoided; the former is a very high form of training, which we should seek to attain."

"Even though not prepared," I interposed, "to give, on the spur of the moment, a fitting reply to all you say; nevertheless, I cannot convince myself that the close order you desire can be maintained under all circumstances. Natural obstacles will play queer tricks with it, and the confusion of the fight will make it more dangerous than the present style of fighting."

"Natural obstacles play the queerest tricks with the modern so-called dispersed fight, by absorbing thousands of troops, and withdrawing them from the fight," answered Hallen, very calmly; "and the confusion of the fight is greatest where there is least cohesion." Certainly, even the best dis-

ciplined troops have moments when they lose both order and cohesion; but the more they have been accustomed to close order fighting, the more harm they will cause the enemy, the less frequent will be such movements, and the greater probability will there be of their speedily regaining order. When men say it is impossible to escape moments of disorder in battle, and that therefore you must give up order and organize disorder beforehand, I am astonished. It is as if a man, afraid of being shot in battle, should at once commit suicide.

"I now come to a phenomenon," continued my friend, "a consequence of the dispersed fight, and one of the chief causes of the frightful mobs which characterized all important infantry engagements in 1870. This phenomenon was the effort of the lieutenant to release himself from company ties, and the similar effort of his captain to release himself from battalion ties, in order to seek opportunities of distinction by individual acts of heroism. The abolition of the dispersed fight is not sufficient to bring order into the combat of greater units without first rooting out this vice. However, as long as officers know that in such deeds lies their best chance of decorations and of honorable mention in official histories, so long will the evil be invincible. Unfortunately there are people who regard this manner of getting out of hand as a particularly praiseworthy quality of our infantry. The fact that such unsound views should be possible proves that the habit of fighting in crowds is rotten to the very core. Perhaps in Homeric days such uncontrolled heroism was in place, but it becomes an evil in the disciplined bodies of the nineteenth century. It is not the heroism of individual groups, but the directed union and order of masses which gains the victory to-day. I am also of opinion that the man who can only be brave on his own account, is not brave enough for a leader. I prefer that courage which executes its allotted task most exactly and punctiliously, indifferent whether such work leads the men under fire, through cover or across the open, against the enemy's front or flank; indifferent as to whether the task promises a brilliant victory or involves certain death for the general good. I prefer such disciplined courage to the valor which, for instance, makes its own way to a point whence, from under cover, it can reach some guns of the enemy, already out of action.

"An officer behaves dishonorably who, without regard either for the common weal or his commanding officer, leads off himself and his men to achieve a personal act of heroism. His motive is a selfish one. Real ambition, the proudest characteristic of a soldier resting on the feelings of honor and duty, has nothing in common with such conduct. I will say nothing about that bolting forward, which consists in marching to the sound of the guns. All 'bolters' should be punished, not rewarded.

"There need be no fear of killing the dash of our officers by forbidding them to leave the path of duty. Every German officer knows that honor forbids him to remain idle where circumstances call for, or permit energetic action."

(To be continued.)

POSSIBLE BATTLE-FIELDS IN THE NEXT EUROPEAN WAR.*

BY MAJOR-GENERAL TULLOCH,

ENGLISH ARMY.

ON the continent of Europe so many men are trained as soldiers that the military strength of any nation may almost be said to be every man capable of bearing arms, that is to say, about a tenth part of the population. In France, for instance, at the present moment there are 3½ millions of trained soldiers, of whom nearly 1½ millions could be mobilized in about seven days. Not only are the armies of the Continental nations larger than any ever before heard of, but their training, armaments, and organization as fighting machines have no parallel in military history. Naturally the thought turns to the two countries which will be the principal actors in the European battle-field, viz., France and Germany. Defeat means to either of them destruction as a nation for a generation at least, and in the case of France possibly obliteration. With such momentous issue hanging on the result of the next great European war, it is an interesting strategical study to investigate the conditions under which the armies of the different countries which must take part in the struggle would have to operate. The nations who, like gladiators, are ready to step into the arena are France, Germany, Russia, Austria, and Italy; and without touching upon politics it may safely be assumed that if hostilities commence between any two of them the others would have to take sides at once, and it is generally allowed that France and Russia would act together against the other three. But whatever the alliances may be, the only way of arriving at their military value is by examining the fighting power of each nation separately. Now, the fighting power of a country is made up, so to say, of several different ingredients, the principal one of course being the number of men properly trained as soldiers, and the total population from which others may be produced. The fighting value of the individual men of European nations is not such a variable quantity as might be supposed. There is not a single country amongst the whole of them whose men have not during some period of history been renowned as the best soldiers of that time. Each nation of course shows some special soldier-like quality which is distinctive of that nation, such as the impetuosity of the attack of the French, the coolness of the English, or the stolidity under fire of the Russian; but any or all of them are almost secondary qualifications when compared with systematic training for battle, perfect organization, and capable leaders. The soldiers of the French Republic at the end of the last century, who fled like sheep before the Allies and massacred their own officers in the flight, became in a marvellously short time, when properly trained and led, the conquerors of Europe, and historical research will show innumerable similar

* A lecture delivered before the Military Service Institution of Victoria, Australia. General Tulloch is on a tour of inspection of British forces in Australia.

examples. It is, however, the future and not the past with which we are now concerned, and to forecast what is likely to happen, the military value of the five mentioned nations has to be examined as to—

1. Population.
2. Power of obtaining money.
3. Number of men trained to arms.
4. Actual value of that training.
5. Organization for war.
6. Perfection of arms.
7. Fighting value of men.
8. Means of communication for assembling and feeding.
9. Defenses, natural and artificial.

FRANCE.

To commence with the country whose stake in the next European war is unquestionably the heaviest, *viz.*, France. Her population is about 38,000,000, and the revenue which has to be raised to meet the interest on the national debt and the annual expenditure is £133,000,000. This would seem to be a burden which would cripple any further large war expenditure, but the figure at which the Rentes are quoted shows that France is a very long way from being powerless to borrow more. With a productive soil, a fine climate and inhabitants (particularly the peasantry, hard-working and frugal beyond those of any other nation) the wealth of France and its recuperative power after disasters have often astonished the world. The total number of men trained as soldiers amounts to 3½ millions, but of these only half a million are permanently embodied. Now, as regards the value of the French military training, it is not even yet what it might be. Some ten years ago I obtained permission to attend the manœuvres of an army corps in France and go where I liked. I was with the troops from daybreak till dark during the time the manœuvres lasted, and the impression left on my mind was that very few of the men took any real interest in the work. The principal subject which seemed to occupy their minds was the number of months or years they had still to serve. The officers were nothing like so keen as ours always are on such occasions. The drill was good and the attack formations rapidly done, but there was somehow a great absence of reality about everything. Outpost and reconnaissance work was decidedly slackly carried out; in fact, hardly any one seemed to have his heart in the work. I have been told that since 1880 there has been a decided improvement, but since then I have had no opportunity of judging as to the working of French troops in masses. About a year ago, however, I saw on several occasions a particularly fine regiment at ordinary drill, and I noticed that certain points had been copied from the Germans, but it struck me these adaptations were carried out more in the letter than the spirit. The men of one company I saw under instruction at outpost were actually amusing themselves in what is known as skylarking. The discipline seemed decidedly lax, and the two officers of the company were walking up and down in the road quite away from their men. To one who has twice had the honor of serving in a campaign with the French as comrades, deep sympathy with old allies in the misfortunes of 1870 was only natural, and it was sad to look on as a professional and think what might some day again be

the result of such training. Defective discipline has too often been the rock on which French armies have been wrecked. Whilst all is going well in a victorious campaign imperfect discipline is not so much noticed, but when reverses happen, a badly disciplined army soon becomes nothing but an armed mob, which is easily put to flight and eventually destroyed. With regard to organization, the following extracts from Colonel Cooper-King's lecture on "The New Frontier of France" summarizes the matter:

"France adopted after the war the territorial system of Germany, though not in its entirety. German recruits are really localized even to companies, but the French conscripts are not so recruited, but are, possibly for political reasons, drafted to regiments or corps at a distance from their homes; the reserve of the active army and the territorial army are posted to depots in their own neighborhood. Thus, though theoretically the French and German systems are similar, there is an important and serious element of difference between them. As the French conscripts are not localized, but serve in regiments away from the districts in which they live, they would not, as a rule, when called in from the reserve, rejoin the regiment in which they had been previously trained. The bond of union, therefore, that exists between the German reservist and the regiment to which he throughout his entire service belongs is wanting in France. While the German joins a force on mobilization in which he is sure to know his comrades and his officers more or less, the French soldier has all this to learn when his corps is mobilized. This must produce a temporary friction which time alone can alter, and of which, in modern warfare, there is little enough to spare. The army is divided into two groups—the field army and the territorial army—each of which has its reserve, but it does not appear that the latter has any permanent organization in peace higher than the regiment. The field army is organized in corps, each two divisions of two brigades of two regiments of three battalions (the fourth battalion of each being for the fortresses), with the battalion of chasseurs-a-pied, eight divisional and eight corps, and one reserve batteries of artillery, one cavalry brigade of two regiments, and one battery with the usual auxiliary services. It numbers 38,335 officers and men, with 108 guns. "Independent" cavalry divisions of two brigades of two regiments, with three batteries of horse artillery are also organized. To absorb her large force of available troops France is divided into eighteen "regions," each of which contains an army corps, and to this must be added the 19th, an Algerian corps, which is also available for use in case of a European war, a local division in Tunis, and an army corps in Annan and Tonquin."

About three years ago the 17th Army Corps was mobilized as an experiment. On the third day the reserves had all joined, and on the eighth the corps was fully mobilized. It was stated by military critics who were present that the mobilization machine did not work so smoothly as on the other side of the Rhine, and that there was some little confusion before the officers and men were established in their respective places and work. It was also observed that the whole energy of the French War Office had been applied to make the mobilization of one corps a success. This may be said to be hypercritical, as the arrangements for mobilization are made in the district of each corps, where the storehouses and magazines have everything ready for instant use. But even if such criticisms had some foundation, the advance made by the French since 1870 has been enormous. At the end of seven days the first line or field army of nearly one million and a half of men and 2000 guns would be assembled, and ready to move into the places assigned for concentration. It is assumed that the whole of the nineteen corps would have reached their positions on the tenth day. As soon as the regiments of the first line moved off from their territorial points of concentration, on the seventh day, the assembling of the second line known as the territorial army, and of about the same strength as the first line, would commence.

With reference to the value of the arms, the French, in both guns and small arms, have always been *facile princeps*.

As regards the individual fighting value of the French, their soldiers, when properly trained and led, have shown what they can do in too many battle-fields to permit of any doubt on the subject. They show to better advantage in the attack than in the defense. The excitable nature of the Frenchman comes out in its best qualities when dashing recklessly forward, but a steady, prolonged resistance on the part of defenders has been often fatal to such impetuous valor, which rapidly exhausts itself. The natural intelligence of the race and fertility of resource have been conspicuous in many campaigns, but when imperfectly trained or when incapably commanded the value of a Frenchman as a soldier does not stand high. Indeed, few soldiers in similar circumstances, can be said to be inferior to him. To a French army defeat is utterly demoralizing, and if the pursuit be well pressed there is an end of the force, but if allowed breathing time no soldiers (that is thoroughly trained soldiers) can pull themselves more rapidly together again, as was proved in the Peninsular War.

With the immense armies now employed, the means of communication by railways, not only for mobilization but even for feeding, have to be very carefully worked out in all military schemes. In a highly civilized country like France all the large towns are connected by railways having an abundance of rolling-stock. With proper organization there should be no difficulty as regards railways. The following from Colonel Cooper-King's paper shows what transport is necessary when mobilizing, and the amount available: "The rolling-stock required per corps is from 102 trains of from 40 to 66 carriages, with a single engine (if light), or 50 to 56 carriages with two engines if heavy (stores or material, as well as men). For one corps 138 engines and 4440 carriages would be required; for 19 corps, 2622 engines and 84,360 carriages. As the Eastern Railway Company of France alone possesses 6000 engines and 200,000 carriages there is no want of carrying power.

The defenses of the country, natural and artificial, have now to be considered. Before 1870 the French eastern frontier was not only naturally strong for defense, but it was also, from its configuration, well placed for offensive operations against Germany. The loss of Alsace-Lorraine has not only deprived France of a million and a half of her best inhabitants, but it has also deprived her of a district which was invaluable from its natural defensive capabilities. When the lost provinces were handed over to Germany, that country then had it in its power to move into France over a comparatively open and easy terrain. There was therefore no other course for the French but to replace the former naturally strong frontier by artificial means. This has been done by intrenched camps, and what are known as *forts d'arrêt*. There are two lines of intrenched camps. In the first are Belfort, Epinal, Toul and Verdun; in the second, Besançon, Langres, Dijon, and Saon; and behind these come Paris with such an extended chain of forts that investment would seem to be practically impossible. Besides these there is an intrenched camp at Lille on the northern flank, and at Lyons on the southern. It may be said that all these works would lock up an immense number of men who would be more usefully employed in the field, but such is not the case. A few men unfit for hard work would be sufficient as simple guards of each fort or battery till the field army required

to make use of them. The entrenched camps also work in with the general scheme of defense as places of assembly for the troops of the second line and rallying points for the field army in cases of reverses. These new works must be looked on more as permanent batteries, ready for the strengthening of positions which would necessarily be occupied by a defending army when an enemy advanced in one of the few directions open to him. The forts and works, some 50 in number, round Paris, of course, make the capital rather more than an entrenched camp. They cost £25,000,000 sterling, and have a total perimeter of upwards of a hundred miles, the object being to prevent a complete investment as in 1870. The total amount expended by the French in defensive works alone is said to be £250,000,000.

The Swiss frontier of France is protected by the Jura Mountains, all the important roads over which are guarded by forts. This frontier would come under consideration only in the event of Germany and Italy deciding to violate the neutrality of Switzerland, and from that country, as a base, directing an allied army against Lyons, for the purpose of preventing the resources of the south of France being used to supply the main army opposite the German frontier.

The line of the Italian Alps is naturally very strong, and where it is at all vulnerable, forts have been built to close the passes. Owing to the peculiar configuration of the Italian Alps, a comparatively small French army could contain and neutralize a much larger Italian one.

GERMANY.

The next nation to be considered is Germany, of which the population is 45,000,000. Germany's ability to obtain money for any purpose would seem to be greater than any other Continental nation, her public debt being apparently under £350,000,000. From the *Statesman's Year Book* the annual expenditure is said to be £70,000,000, but this may not include the 30½ millions referred to in the Budget of the Empire; but be that as it may, it would seem to be sufficient to meet the annual expenditure. In addition to the almost unlimited power to borrow at a moderate rate, a large portion of the indemnity obtained from France is said to be kept in hand in gold ready for any sudden war expenditure.

The number of men trained to arms is about the same as in France, but the actual value of that training is unquestionably greater than that of any other European nation. Although three years is the nominal time for the first period of service in the active army, the infantry usually get off with less than two, but the work the men do during that time is most thorough, and the discipline, training, an iron one. From daylight till dark the work goes on, regardless of weather, the object for which the army is maintained—viz., the day of battle—being constantly kept in view in everything done. The pains taken with each individual soldier has to be seen to be believed, and the systematic way in which every officer and non-commissioned officer carries out the work assigned to him in the task of teaching the men must insure success when the time of trial comes. The officers, particularly in the junior ranks, hardly know what recreation means, but none of the time on duty is wasted. Some people have an idea that a German subaltern

is merely a drill corporal. Nothing could be more incorrect, the German is far too practical to use a razor to cut pencils with. The officers superintend the work of the corporals and sergeants who are drilling the recruits, and do so most thoroughly. To an English officer, the power given to a sergeant with an awkward recruit seems excessive, but no matter how an unfortunate stupid peasant may be bullied, he never shows the slightest sign of irritation. To an ordinary looker-on the discipline and severe training of a German recruit may seem almost cruel, but to those who know what the requirements of war are the final thought is, fortunate the nation with such patriotic citizens, who submit to such severe training for the general safety of their country. The motto "For God and Fatherland" in every barrack-room is in itself sufficient to show what sterling stuff the German is made of. The system of supplying officers for the active army, and also for the reserve, works admirably. Not only are the regimental officers about as good as it is possible to make them, but there are also sufficient thoroughly trained officers on the reserve list ready to fill up all mobilization and war vacancies. No other nation has yet been able to accomplish this most important part of military organization. The German organization for war has been proved to be so perfect that it is hardly necessary to do more than refer to it. The country is divided into 18 districts, each of which furnishes an army corps. The army corps consists of 24 battalions of infantry and 96 guns, that is to say, one battalion and one battery less than the French, but the total numbers are greater. The Germans as regards their second line have a considerable advantage over the French, the organization being completed up to the division, that is half an army corps; the French only go as far as the regiment, that is three battalions.

Judging by what the Germans have previously done, it is probable that the organization of the second line goes a good deal beyond the formation of 18 more divisions. It is more than possible that the 18 divisions are in reality 18 army corps, which would thereby enable the Germans to put 36 army corps in the field almost immediately on hostilities commencing. The German rifles were not as good as the French in the last war, and the French still keep the first position in that respect, and will do so till the Germans have manufactured a sufficient number of small-bore magazine rifles to take the place of the larger bore they now use. The fighting value of the German in these days of long range shooting stands higher than the more impetuous and possibly more recklessly brave Frenchman. The Teutonic temperament is eminently qualified for imbibing that special requirement of the present time, viz., fire discipline. This is ground into him in his training in such a way that it is carried out almost mechanically when in action. This training, combined with an iron discipline and ardent patriotism, places the value of the individual German soldier on a very high pedestal.

The railways, especially strategical lines, have been largely added to since 1870, and there is every reason to believe that the system which twenty years ago worked like well-oiled machinery would do so again, even with double the number of troops to carry.

When the provinces of Alsace and Lorraine became German property, that nation acquired a frontier stronger not only in the natural features of the ground, but also possessing the two first-class fortresses of Metz and Strasburg, which have been improved into immense intrenched camps. The Rhine itself, to say nothing of its fortress-camps, is a powerful line of defense, but it is not with stone-walls, but with men and a perfect system of organization, which will enable it to rapidly mass overpowering forces on decisive points, that Germany proposes to protect the Fatherland.

ITALY.

The next of the five countries for consideration is Italy. This is on account of its geographical position with regard to France. Before the Triple Alliance was arranged the Franco-Italian frontier was almost free from defensive works. Now they absolutely bristle along the mountains, both nations having guarded all the roads and principal passes which cross the frontier.

The population of Italy is about 29,000,000, and her debt is already £450,000,000, with a yearly deficit. The taxes are heavy, and it seems doubtful if more money could be got by increasing them. But with all this burden of taxation the people are very patriotic, and bear it patiently. Even the expenditure for the new ironclads is not questioned, although for such a country as Italy it is immense.

There is some difficulty in arriving at a correct estimate of the number of men thoroughly trained. The war strength of Italy is, however, stated to be as follows: Active army and reserve, 850,000; mobile militia, 400,000; territorial militia, 1,310,000. Of these the estimate of the field army available for active operations varies from 300,000 to 450,000; the remainder of the 850,000 would be required for fortresses, forming depots for second line, and such like. It is calculated that about 200,000 of the mobile militia would be available for forming a field army of the second line.

The Italian army is organized in twelve corps, and the time required for mobilization is stated to be three weeks, as the reservists have to rejoin their original regiments, which, for political reasons, are recruited from different parts of the country. The delay and probable confusion on the railway caused by men from Rome joining regiments, say, in Milan, and others from Venice going, perhaps, to Sicily, would be a most serious matter where time is everything in modern warfare. Except the rather unfortunate campaign of 1866, which was hardly a fair test for a newly-formed nation, there has been no undertaking from which an estimate can be formed of the value of the Italian military organization, but their scheme for mobilization does not stand high in the opinion of military experts. The Abyssinian expedition having been more that of an army of occupation does not give sufficient data for forming any decided opinion. The training of the Italian troops has nothing special to distinguish it from that of other armies, excepting that there appears to be rather a lack of energy. A generation ago the Sardinian army was perfect; smarter men and officers it would have been hard to find; possibly the southern element has now somewhat diluted the northern energy. The fighting value of the

Italian soldier of the present army has yet to be proved, but judging by our old allies, the Sardinians in the Crimea, it will not be found wanting when the time comes; but that the *dolce far niente* Neapolitan can ever stand on an equality with the soldiers from the northern provinces is an impossibility.

The magazine rifle of the Italian army, being a .408 calibre, is now considered to be inferior to the small-bore being made for other nations.

In the basin of the Po and its tributaries there is a perfect network of single-line railways, but the communication as regards the rest of the kingdom, by road as well as by rail, is very deficient. The range of the Apennines has caused the two lines of railway on the east and west coasts to be carried close to the sea throughout the entire length of the country. These two main lines are in places connected by short railways, but the position of the coast lines, on which the movement of troops for the defense of the country must, in a great measure, depend, is a serious matter for Italy, should she be engaged with an enemy having a superior fleet. It may be added that neither rolling-stock nor stations are well suited for the movement of large bodies of troops.

The Alps, which completely encircle Northern Italy, form one of the strongest natural barriers against invasion; and since Italy joined the Triple Alliance every road and valley opening in the direction of France has been closed by strong works. There are mule paths in some places over the Alps at certain seasons, but to make them passable for artillery would be too vast an undertaking for military operations where time is of such value. Peninsular Italy is very open to attacks from a superior maritime power. The protection of the coast towns would absorb a large portion of the army, which therefore could not be made available to meet an invasion from the north. With the exception of Spezzia, there is really no thoroughly protected coast town, and the inland fortresses would be of little use if the French succeeded in breaking through the barrier of the Alps. In such a case, Turin would probably be the first objective. If a French force succeeded in establishing itself on the Turin side of the Alps, and were acting against Italy alone, there would be nothing left for Italy but to make peace as soon as possible.

BELGIUM AND SWITZERLAND.

Before investigating what would probably be the lines of operation in a war between France and Germany with Italy as an ally, it will be necessary to refer to the military strength of other nations whose territory might be made use of by the combatants. These countries are Belgium and Switzerland. Belgium could put two army corps in the field, but unless supported by some other nation, could not operate further south than Malines, which is about twelve miles in front of Antwerp. When the forts around Namur and Liege are finished, the railways in the Valley of the Meuse will be closed to both combatants, and will do more to prevent Belgian neutrality being infringed than many treaties. Other lines, south of the Meuse, can be made use of as lines of communication by either French or Germans, but they would be very inconvenient as compared with those passing through Liege

and Namur. If either side considered it necessary to violate the neutrality of Belgium, it would be more advantageous to Germany to do so than France. A glance at the map showing the boundary lines of the different States, and how hazardous it would be for France to make almost a flank march to strike the lower Rhine, is sufficient to illustrate what is meant. A German force could move through Belgian territory direct on Paris with much less risk.

Switzerland, placed in the very centre of three possible combatants, is in a much more precarious position as regards violation of territory. That country is quite open to either France or Germany, should those nations consider it fit to make use of it. The Italians alone could not force the barrier of the Alps and debouch into the Swiss plains without the assistance of the Germans to clear away the Swiss troops holding the passes, and the French would find it a difficult matter to move into Italy if Switzerland and Italy were forced into an alliance by any hostile action of the French; but to the Germans the Swiss plains are quite open should they consider it advisable to move across the Rhine. There is an idea that France might, if at all successful, try an invasion of Germany by moving through Switzerland and crossing the Rhine at Schaffhausen, but Switzerland has always been very jealous of any attempt to infringe her neutrality, and would in every probability decide to try to stop the trespassers on her soil, and this might be attempted on the line of the Aare. An entrenched camp has been suggested at Zurich, but nothing has yet been done. As regards fortifications by the Swiss, a small amount of fortification, such as that at Airolo to guard the tunnel and one or two other important points is all that has yet been completed; the natural strength of the country and the patriotism of some 150,000 fairly trained militia is considered sufficient to meet all requirements.

POSSIBLE LINES OF OPERATIONS.

The military strength of the countries of Western Europe who might have to take part in the next war having now been reviewed, it will be advisable before turning towards Russia and Austria to try to investigate the probable lines of operations French or German armies might adopt. Before attempting to forecast the future, it will be useful to use as guides the operations of the last great war on the Rhine frontier. When the French decided to commence hostilities, the scheme of their Emperor was to mass 150,000 men at Metz, 100,000 at Strasburg, and with the united armies to cross the Rhine at Maxau, and attempt to break up the confederacy. The German scheme cannot be more lucidly told than in the words of Colonel Cooper-King:

"The plans open to the Germans were of a more simple character. To invade France by way of Belfort was out of the question, for it was too far away, and the long lines of communication would traverse the whole of Southern Germany, and would be parallel to the French frontier. There would be a remote possibility of disturbance by French troops from Strasburg. The ground between the latter place and Mulhausen was very unsuitable for military operations, and the only portion of the frontier available was that bordering on the Rhine provinces of Prussia and the Palatinate. To violate Belgium was unnecessary under the circumstances of her adversary's known weakness in every way. Therefore, Germany massed her forces between Treves and Landau, ready to meet the French directly if they advanced from the northern side of the salient

frontier, or attack them in flank if they ventured to cross the Rhine on its eastern face. If the opportunity arose, they could carry the war into the enemy's territory by the easiest way and the shortest road. Their first and most natural objective was to beat the French armies in the field, their ultimate aim the capture of Paris. So centralized was the political and military organization of the Empire that the possession of the capital, as in 1814 and 1815, would probably terminate the war. Early in August, therefore, Germany had concentrated her three armies—the first under Steinmetz at Treves; the second under Frederick Charles, about Kaiserslautern; the third under the Crown Prince of Prussia, about Landau; the total force amounting to 462,000 infantry, 56,800 cavalry and 1584 guns. The general plan of the German staff was to pivot the army of invasion on the right, and wheeling forward the left wing, or third army, to successively turn the natural obstacles of the Saar to Northern Vosges, and the Moselle, and interposing between the French armies and the bulk of France which lay to the southward, to force them against the northern frontier and separate them from Paris. How the battles of Spicheren, Weissenburg and Woerth, along the Saar and Vosges, and those of Colombey, Mars-la-Tour, and Gravelotte, on the Moselle, resulted in the dispersion or imprisonment of the 'Army of the Rhine' are matters of history."

According to Colonel Cooper-King's investigations, the intention of the French is "to place their first field army as follows: Two corps in Paris, one each in Lyons and Belfort, and fifteen in line, in three armies. Left on the plateau of Boncouverille, in front of Commercy; centre on the plateau of Hayes, near Nancy; right on the plateau of Amanvillers, ready to act defensively, or to move forward."

If possible, the object of the Germans would probably be to engage the French at once, and if beaten to drive them back as before against Belgium, and so cutting them off from the rest of France. The French, if beaten, would unquestionably now try to retreat across the Loire towards the south. Paris, it is believed, could easily hold her own till the reinforced French armies from the south were ready to move northward.

If the Germans were not successful at the very commencement of the campaign, then it is more than probable that the French would try a counterstroke from Belfort, but not through Switzerland and across the Rhine at Schaffhausen as is generally supposed. If the French were in a position to attempt an invasion of Germany and the upper Rhine, such would imply that they had a superiority of force sufficient to confine the Germans at Strasburg. If such were the case there is a much more direct road into Germany than *via* Schaffhausen, *viz.*, by the Black Forest. For many years it has been assumed by military writers that the Black Forest is impassable to armies. This might have been so at the beginning of the century, but even that seems doubtful on investigation. In the French account of Moreau's campaign of 1796 immense praise is given to that general for his masterly retreat after the Austrian victory at Wurzburg. Particular stress is laid on his march through the Valley of Hell, a fearful pass, where the rocks almost touched on either hand. On examining the actual ground over which Moreau passed it turns out that his passage of the Valley of Hell was really not more hazardous than an ordinary march in his own country. Two battalions of Austrians who were in the open near the entrance of the entrance of the pass were easily brushed on one side, and the forcing of the pass consisted in marching unopposed seven miles along what was even in those days a very fair road. Had the Austrians in inferior force been on the high plateau on each side of the gorge there was really nothing in the nature of the forest to prevent the French clearing them away from the edge of the ravine. Since those days a network of the most perfect roads

imaginable has been made all over the Black Forest, and it has been proved that guns can be taken up almost any of the rough tracks, even to the top of the Feldsburg, so easy generally are the slopes of many of the hills, except in the ravines. From the valley of the Rhine to the open country on the east is but one day's march. It may be said that the passage of the Rhine anywhere between Strasburg and Bâle, where it is some 200 yards wide, with a swift current would be too serious an undertaking. That river, however, has been crossed there several times by the French, even under fire, and if victorious they would not hesitate to attempt it again. The moral effect of crossing the Rhine would be so great that even if only partially successful, it would be worth almost any sacrifice of men, and it seems strange that the Germans have not prepared a position higher up the Rhine, opposite the Belfort *troué*. Certainly, the works at the little old fortress of New Breisach have been modernized, but something more than that seems necessary. About six miles south of Freiburg, in the Rhine valley, there is an excellent natural position, with the right on the Rhine and the left thrown back towards the Feldsberg. This line being so strong may be considered sufficient, but nevertheless a double *tête*, connecting old and new Breisach seems almost a necessity. But to return to the first position of both armies at the commencement of the next war. The Germans being able to mobilize quicker, would undoubtedly try to repeat their work of 1870, and attack the French before they could get all their forces into line, and so beat them in detail. Should they succeed in this, they must conquer in the end, although they will take much longer about it than they did twenty years ago. Doubtless some of the intrenched camps would prove to be regular Plevnas, and Germany would be almost worn out before France was entirely subdued. If the French are able to get their armies into position in time then one great battle some thirty or forty miles south of Metz (in which numbers such as have never before been heard of will be brought into action) should practically decide the war.

EASTERN EUROPE.

The military situation of Eastern Europe, with reference to the three nations, viz.: Germany, Russia and Austria, opens an entirely fresh field for consideration. A campaign on the Vistula would necessarily be quite distinct from one on the Rhine, although both, it is assumed, would be carried on at the same time.

RUSSIA.

To commence with Russia, which country may be described generally as a huge plain, drained by sluggish rivers of great size, with marshes and pine woods occupying a large portion of the ground, particularly in the north, its means of communications by road or rail being very deficient, and the people poor and very ignorant.

The total population in European Russia is estimated at 90,000,000, and is said to be increasing at the rate of one million a year. To the above might be added the inhabitants of the Caucasus, numbering 6,000,000. Asiatic Russia is said to contain 10,000,000. The finances of the country

are generally considered to be in an unsatisfactory condition, and, judging by the newspapers, Russia seems to find increasing difficulty every time a new loan is advertised. The country is unquestionably very deeply in debt, but the precise amount is unknown ; the interest-bearing portion is about £420,000,000. The Government paper money, the rouble, is now at 80 per cent. discount. This alone will give an idea of the financial condition of an empire which covers about one-seventh of the territorial surface of the globe.

The standing army of Russia numbers about three-quarters of a million, and on mobilization upwards of one and a quarter millions of men could be placed in the first line, with another million in the second. The European Russian active-service army is composed of 17 army corps, each of 32,000 infantry, 4000 cavalry, and 108 guns ; in addition to these there are six rifle brigades, having a total of about 25,000 men, besides the force in Finland. It has been calculated that Russia could place, as field armies, upwards of three-quarters of a million of men and 1800 guns on her western frontier in 25 days after the order to mobilize was given. This does not include the two army corps in the Caucasus or the troops in Asiatic Russia. The training of the Russian soldier, who remains four years with the colors, has been much improved since the last Turkish war, but the army is heavily handicapped by the want of education generally of the class which should supply its officers and non-commissioned officers. Accustomed before he joins the army to a life of privation and a severe climate at all times, the rations of other armies would be a luxury to a Russian private soldier. Stolidly brave and uncomplaining under the most adverse circumstances, the Russian, although dull in intellect and deficient in Western energy, makes a good soldier, and when commanded by a man like Skobeloff he can even show enthusiasm for his general similar to that of the Old Guard for Napoleon. Fortunately for Europe, but few Skobeloffs or Suvaroffs have come to the front in Russia, where high social rank, no matter what the professional qualifications may be, seems the first consideration for Russian commanders in great wars. The organization of the civil branches of the army, especially the commissariat, has become a by-word in Europe. Yet, notwithstanding all these drawbacks to military efficiency, the borderline of Russia during the last hundred years has crept steadily forward ; its progress has been aptly compared to that of a glacier—slow, but sure, and never going back. Money for warlike purposes may be scarce, but men are plentiful, and losses from defective commissariat and bad sanitary arrangements on active service which would appall a Western nation are thought little of in Russia, provided the object in view be obtained.

The magazine rifle has not yet been adopted by the Russian army. Want of money is probably the reason. Their artillery is very good, and in some respects is said to be ahead of that of other armies, particular attention being given to this branch of the service. A short time ago many regiments of the Russian cavalry were specially trained to act dismounted as infantry, the idea being supposed to be that a large cavalry force should, on the outbreak of war, dash into the enemy's territory, and by destroying his railways and magazines of provisions and stores, paralyze at once his

scheme of mobilization. But this idea does not now seem to be in much favor, possibly because Austria, against whom it has been prepared, has taken precautionary measures by greatly strengthening her cavalry.

Russia being mainly an agricultural country, the inhabitants, speaking generally, live in villages, the total urban population being only a little over 10,000,000. Of these, 2,000,000 live in the three cities of St. Petersburg, Moscow, and Warsaw. With the exception of a few main trunk roads, roads which are understood as such in other parts of Europe hardly exist. The large rivers, of which the bridges are very few, are used in summer for the transport of produce, and in winter sleighs can cross the country anywhere. Railways, single lines, now connect the principal centres of Russian life, but as a rule the railways in Russia have not been constructed for commercial purposes, although, doubtless, foreign subscribers to loans were under that impression. For some time past efforts have been made to complete the strategical railway system for massing troops on the western frontier. These, when completed, will necessitate further expenditure by Germany and Austria for fortifications on similar strategic lines.

No country has better natural defenses than Russia. Large rivers with hardly any bridges, immense marshy districts—that of the Polesia being some thousands of square miles in extent—very few roads, and in the north scanty supplies of food and forage, with miserably poor peasantry scattered over wide expanses of territory, and a severe climate, make Russia a most difficult country to campaign in. The winter begins in November, and breaks up about the end of March; but it is not till May that the country on the Polish frontier is dry enough for campaigning. With such extensive natural defenses the construction of a few artificial ones, at strategical points, is all that is necessary. Close to Prussia there is no special line of defense, but 100 miles further eastward there is the broad expanse of the Vistula, which even at Warsaw is upwards of a quarter of a mile wide. On this river, which lies directly across the path of an invader from the west, strong intrenched camps have been constructed at the three important road-crossings and river-junctions of Novo Georgievsk, Warsaw, and Ivangorod. And 120 miles east of Warsaw, at the most important place on the Bug, viz., Brest Litewsk, where several roads and railways converge, another intrenched camp has been placed astride the river. North of Warsaw the marshes of the Narew and the sterile Masuren district guard against any serious advances from that portion of the Prussian frontier, the works at Goniondz cover Bielostok, and the fortresses of Kovno and Dunaberg protect the railway and road junctions, and to a certain extent would give check to an invasion from the direction of Konigsberg. Opposite the Austrian frontier, just south of the Great Polesian Marsh, which is 300 miles in length, is the important road and railway junction of Rovno. To protect this, works have been constructed at Dobno, about midway between Rovno and the Austrian frontier. In rear of this southern portion of the line of defense comes the Dneiper, with the fortified town of Kief, where the main road and also a railway line cross the river, which is here 1000 yards wide.

AUSTRIA.

The last of the five nations to be considered is Austria, of which the population is 40,000,000. This empire is made up of many nationalities, all speaking different languages, and whose patriotism cannot therefore be as steady and strong as that of a kingdom with one language, and acting, so to say, with one mind. The public debt is upwards of £450,000,000, with a chronic annual deficit of four or five millions. Any change for the better seems hopeless as long as Russia maintains such large armies close to her frontier.

It has been computed that Austria can place one and one-quarter millions of men in the first line, and another half-million in the second. As regards the actual value of the training of the Austrian soldier, whose service under the colors is three years, it has become much more practical during the last few years, but even now the shadow of the barrack square seems to deaden its vitality. Routine, red-tape, or whatever other name that apparently immortal enemy to military efficiency is known by, has a congenial soil in Austria. No matter what defeats the monster in question may have brought on the unhappy Austrian army, he is allowed to live, and is even fostered, in the dual empire, notwithstanding that one of the highest military authorities in Austria has spoken out plainly on the subject. A lecture given by Field-Marshal the Archduke John, commanding the 25th infantry division, at the Military Scientific Society of Vienna, in 1883, shows how the Austrians are following the letter and not the spirit of the Prussian system. Amongst other absurdities he mentions that the soldiers are directed to loosen the screws of their rifles in order to make them ring when the men are going through their exercise. The field-marshal speaks out in clear unmistakable language, saying : " We are copying our Prussian masters, being influenced solely by the results they have achieved, and fancying we see the road to success in the caricature of their stiff drill." The lecture at Vienna by such a high authority is an excellent sign, and seems to show at last that the Austrian army may hope before long to shake off that system of stolid military conservatism which, like the old man of the sea, has been an intolerable burden and the cause of defeats which the Austrians have suffered. The Austrians, following the German example, recruit as much as possible territorially ; in peace time, there are little more than a quarter of a million of men under arms, organized so as to be expanded by the reserves into 15½ army corps and 28 battalions of infantry, 1 regiment of cavalry, and 88 guns. The second line and landwehr are apparently organized like the rest, on the German model. Unfortunately for Austria, it cannot, apparently, have the same system as the Germans for producing capable commanders and a perfect general staff. In Austria high military command with or without professional ability is still said to be an hereditary privilege, and in the future will probably produce the same results as in the past. There is another special defect in the Austro-Hungarian army, from which others are free, viz. : the multiplicity of languages of the different nations composing the empire and the possible want of enthusiasm in some of the regiments, for what in other countries would be a united national cause. It is said that this line of weakness showed itself in the campaign in Italy in 1859, and also at Königgrätz.

The terrible lesson which Austria learned in 1866, when her infantry, fought with muzzle-loaders against the Prussian needle-gun, has never been forgotten, and now their small-bore Manlicher magazine rifle is said to be the best small arm in Europe. Some able military critics even go so far as to say it is better than our own rifle, which has just left the inventor's hands. The Austrians also pay great attention to their artillery, and, like all Continental nations, except the French, they use the Krupp system. As regards the fighting value of the private soldier, it has always stood high, the German race forming a very large percentage of the whole. When beaten the fault has not been with the men. The Hungarians, who number some 15,000,000, make the finest cavalry in Europe, and have shown how duty should be done on many a battle-field. In 1866 nothing could have exceeded the magnificent way in which the Austrian cavalry fought to cover the retreat of the infantry at Königgrätz.

The railways, with the exception of the Trieste, Vienna, and Germany line, are almost entirely single. Efforts are being made to increase the lines over the Carpathians, between Cracow and Lemberg, to facilitate the assembling of the army in that very vulnerable portion of the frontier. But, speaking generally, the railway and road communications of Austria are sufficient for all ordinary requirements. Owing to the Carpathian Mountains encircling the great plain of Hungary, and so dividing it from the rich province of Galicia, the general direction of all the roads and railways of Galicia is east and west, between the Carpathians and the Russian frontier. Four railways cross the Northern Carpathians, connecting the Galician railways with Hungary; but these are hardly yet enough to enable a sufficient force to be assembled in Galicia to meet a Russian advance from Poland. The proximity of the Galician lines to the Russian frontier is unquestionably a great source of weakness as regards the defense of the empire. The idea of massing such numbers of Russian cavalry on the border is supposed to be for the purpose of dashing across the frontier and destroying the Galician railways, and thereby hindering the mobilization of the Austrian arms to such an extent as to prevent the occupation of the pre-arranged positions for the defense of Galicia before the arrival of an overpowering Russian force. The numerous bridges on the Galician railways, which run parallel to the Carpathians, make the stoppage of the railways a comparatively easy matter if the Russian cavalry were well handled. The Eastern Carpathians are a wild and very difficult range of mountains, having very few roads and no railways across them.

No country has so few natural or artificial defenses. The Northern Carpathians, south of the line Cracow-Lemberg, and known as the eastern and western Beskid Mountains, are not very formidable military obstacles. They are crossed by two railways, several good roads, and many inferior ones. This mountain range would, however, unquestionably afford some good positions for resisting a Russian advance if the Austrians had been forced back from their defensive position on the line of the Vistula and the Save, which lies between their only entrenched camps at Cracow, Jaroslav, and Pizemysl. Were sufficient funds available, doubtless the northern frontier of Austria would be strengthened with suitable fortifications, but

so weak is this line at present that some military authorities are of opinion that it would be the better plan for Austria to improve her mobilization scheme to such an extent as would enable her to move sooner than Russia, and so be able to invade Poland at the commencement of hostilities. The line of the Dneister, from near Pizemyl to the vicinity of the Roumanian frontier, when looked at from a tactical point of view as a defensive position, is a strong one, but strategically considered, it is of little value. The main attack must be on the northern frontier, and if that were forced then an army on the Dneister would be in a critical position. From an inspection of the map it would seem as if two or three thousand fortress troops might be usefully placed in strong intrenched positions at each of the railway junctions of Stryj, Stanislaus, and Ozernowitz.

POSSIBLE CAMPAIGN ON THE VISTULA.

Previous to attempting any forecast of a campaign on the Vistula, it will be necessary to know the German military strength in men and fortifications on their eastern frontier. Commencing on the north, there are the fortresses of Konigsberg and Danzig, which may, from their water communications, be said to form one. Then comes the Vistula, with the fortress and intrenched camp of Thorn, and south of that, at the next rail and road junction, the strongly-fortified position round Posen, on the Warta. Further south there is Glogau and Viesse, and between them the important focus of roads and railways at Breslau, on the Oder. No intrenched camp has yet been formed at Breslau, but apparently one will be necessary as soon as the Russian railway from Lodz is completed to the Russian frontier at Wiernszou. The marshes and lakes on the southern border of East Prussia, and the swampy nature of the country east and south of Posen, add greatly to the defensive strength of the German frontier. There are only three and a half army corps on the eastern line, with headquarters at Konigsberg, Posen, Breslau and Bronberg; but the German power of varied mobilization and concentration obviates the necessity for maintaining large forces near the borders. With the Russians it is very different. Owing to their defective communications the greater portion of the Russian army has to be placed on or near its western frontier. Within a radius of 100 miles round Warsaw—and all connected by railways—are no less than three army corps, with two more opposite East Prussia, and two also in close proximity to the Austrian frontier. Behind these, at Moscow, and south of it, are six more army corps, the whole being in railway communication with each other and the force in Poland. Certainly the lines, with a very small exception, are single, and unable to run more than ten trains per day; but even with this drawback it has been calculated that Russia could fill up the regiments from the reserves, and place field armies amounting to three-quarters of a million of men and upwards of 1800 guns on her western frontier in twenty-five to thirty days. If acting against Prussia alone, some 400,000 might be concentrated on the Vistula with about 200,000 on the lower Nieman, and the remainder connecting the two forces at Grodin and Bidostock. Against Austria alone half the total Russian force might be concentrated in Poland and half on the north-eastern boundary of Austria, both ready to move on

the line Cracow-Lemberg. Austria has only two army corps permanently stationed on her frontier, viz., at Cracow and Lemberg, but it is believed she could in 26 days concentrate a total of 12 army corps and 6 cavalry divisions on the line Cracow-Lemberg, giving a total force of about 450,000. The other three corps of the Austrian army could be concentrated in about a week afterwards. Owing to better means of communication and shorter distance the second line could be brought up much quicker than the Russian. Great efforts are being made even now to increase the strength of the Austrian army, and it has been stated on good authority that when the plans are in working order Austria will not be much behind Russia in military strength. In the event of war between Russia and Germany, if the former power took the offensive, a portion of the Russian forces would have to guard against a movement from East Prussia, whilst the main armies from the Vistula marched in the direction of their objective—Berlin. Against Austria alone the main Russian attack would in all probability be from Poland up the line of the Vistula or Save, the remainder possibly working on the line Rovno-Lemberg, to form a junction with the armies from Poland. If the Austrians were beaten the supposition is the line of retreat and invasion would be over the Carpathians into Hungary. Were Germany acting alone, and able to take the initiative, then a direct move on the Vistula is, by professional critics, supposed to be the most probable line of advance. If Austria and Germany were allied, it is supposed the Austrians would move north between the Bug and Vistula, working in conjunction with the Germans in their direct attacks. If the Russians were then driven out of Poland, and a continuation of the war decided on, the next objective would probably be Moscow, the centre of Russian life; there are two lines of operations for such an advance, one being north of the Polesian Marsh, by Smolensko, and the other south of it by Kief.

CHANCES OF PEACE OR WAR.

The military strength of the five great Continental powers having now been stated, it may be worth while to investigate the possible chances of a European war, for which twelve millions of trained soldiers are ready. Germany unquestionably desires peace; the annexed provinces of Alsace and Lorraine are becoming less French and more German every year. Although they may be at times a bitter feeling against Russia, peace with that country has always been one of the first principles of German policy. France, if the chances of success were decidedly in her favor, would unquestionably try to win back the conquered provinces, but none now know better than the responsible French authorities that in a single-handed contest with Germany that nation has all the chances of success on her side, and that if successful, France, as a great nation, would probably disappear from the political map of Europe. Italy is, even in peace time, taxed to almost breaking strain, and unless the English navy came to her protection must, with her long unprotected coast line and towns, suffer severely if opposed to France. The dream of Italy is to be a great naval power and mistress of the Mediterranean, but whether her finances will permit such a growth

of naval strength is doubtful. On the land side the French Alps shut her in completely; certainly as an ally to Germany, a united army might violate the neutrality of Switzerland, cross the Jura, and strike at Lyons, but to do this would make Switzerland a traditional enemy of Italy. Another and perhaps safer course is, however, open to her, viz., to send an army to help her old enemy, the Austrians, in a contest with Russia. Italy's policy is unquestionably to keep quiet if possible, and reduce her present heavy taxation. Austria would be only too glad to be certain of peace; unfortunately the immense Russian forces so close to her open frontier necessitate her remaining always ready, and continuing her ruinous expenditure. A war which would give Poland to Germany would certainly be an immense relief to Austria. The dream of some Teutons is a union of all the German speaking people in Europe, but that idea is doubtless a long way from realization yet. If it ever does take practical shape, a new federation, extending to the Black Sea, would probably be made; in the meantime Russia is politically hostile to the Austrians, who occupy a strong position on the flank of her advance towards her ultimate object, viz., Constantinople.

There now remains only Russia to be considered. According to the newspapers, discontent, secret societies, and conspiracies against the government are more numerous than ever, and the financial condition of the country certainly does not improve. Under such circumstances, war might possibly be considered a useful expedient to divert public attention from home politics, and also to give congenial employment to the large military element amongst the better classes. Another move direct on Constantinople would bring Austria and the other nations of Europe into the field, and would not be advisable, more especially as the intrigues going on amongst the new kingdoms south of the Pruth do not seem to be entirely favorable to Russia. Warlike operations in Asia, however, would not necessarily affect the Triple Alliance. Russia is steadily sapping forward from the Caucasus, and has certainly marked out Armenia as the next portion of Asia Minor which should be added to the empire. The desert railway has at last been completed to the borders of Afghanistan, and this gives Russia the power of massing troops close to India, thereby preventing England from sending more than two army corps to help Turkey, should that country be attacked in Asia Minor. All things considered, the possibility of war in Europe, where five nations are armed to the teeth, seems very much less than a war in Asia between Russia and England. With the great politicians who are behind the scenes, there are doubtless some insuperable objections to England joining the Triple Alliance, but to ordinary lookers on it would seem that such a proceeding, in which the command of that sea would be worth many army corps, should do much to insure permanent peace to the whole world.

LETTERS ON ARTILLERY.

BY PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by Major W. L. HASKIN, U. S. A.

XIII.

UPON the proposition to open with artillery fire but a short time before the infantry encounter, and then at destructive range. * * * * I was prepared for your first objection and for the question which necessarily follows.

From the fact that the fire of field artillery has become so murderous, we are tempted to draw the conclusion that the annihilation of an enemy may be accomplished in a very short time, and consequently that, if the infantry attack is to take place immediately afterward, it will be necessary, before opening with the artillery, to wait until the infantry shall have approached the enemy near enough to profit, in making its offensive movement, by the moment when the effect produced by the artillery shall be greatest. Overwhelmed in this fashion the enemy will not have time to escape the shock or to rally and re-establish his lines.

I have heard this idea advanced many times, and a recent pamphlet upon the proper use of field artillery has seriously adopted it. The precise time is laid down and it is stated that to bring to a victorious end this artillery duel, which should begin at a distance of 2200 yards, a quarter of an hour will suffice, and that the same length of time will be required to overwhelm the enemy's infantry. From this the conclusion is drawn that the artillery duel should begin but a half hour before the moment when the lines of skirmishers, in attacking the enemy, will mask their own batteries.

Before discussing this matter in detail, I pray you to take a look backward with me, even to the time of the ancient Romans.

When the triumvirs disputed for the empire of the world, the great battles they fought usually terminated only with the almost entire extermination of one side. A hundred thousand corpses of the vanquished covered the field of battle,—so the historians tell us.

In the following centuries the more deadly the newly invented arms became,—the greater the range of their projectiles,—the less bloody the battles became.

Since balls and bullets have replaced the arrow and the lance, the losses have been still more reduced, and that in a very considerable degree.

Frederick the Great (History of the Seven Years' War) called the battle of Prague, one of the most murderous of the age. He gives the loss of the enemy at 24,000 men (including 3000 prisoners), and his own loss at 18,000 combatants, without including Marshal Schwerin, whom he values at 10,000 men; 61,000 Austrians and 64,000 Prussians took part in the battle. The number of killed and wounded was about thirty per cent. of those engaged. The battle lasted from nine o'clock in the morning until eight o'clock in the evening.

In the battle of Aspern, which lasted two days, 75,000 Austrians (according to Höpfner) fought against more than 80,000 French. (This figure is that of the French effective force, deduction being made for the losses suffered the first day.) According to the Austrian official report the loss of the Imperial Army amounted to nearly 20,000 killed and wounded. Napoleon's bulletin gives as his loss 1100 killed and 3000 wounded, but Höpfner, after having studied all the French official reports, states that, excluding prisoners, the loss amounted to 42,000 combatants. These figures being divided between the two days, the struggle at Aspern is found to have been less bloody than that at Prague.

According to Höpfner the Austrian army at Wagram was 124,000 strong, and the loss amounted to a little less than 24,000. It has been impossible to determine the loss on this day of Napoleon's army, which had a strength of 180,000 men. The bulletin, as for Aspern, speaks of 1100 dead, and from 3000 to 4000 wounded. In any case the battle of Wagram, which also lasted two days, was less bloody than the battle of Aspern.

In citing these two battles I do not know whether I have named the most bloody of the Napoleonic wars, but I think that I have. At Leipzig, at least, the allies only lost during the three days of the battle but 49,000 out of 330,000; that is to say about a sixth of their effective strength, or five or six per cent. for each day.

One of the most bloody combats of this century was the sortie of the garrison of Fridericia, in 1849, which lasted until the Schleswig forces had lost a quarter,—twenty-five per cent. of their combatants. This is one of the last actions fought with only smooth-bore arms. Since that date all armies have been provided with rifled cannon and small-arms.

Of all the battles which have been fought between forces armed on both sides with modern arms the most bloody were, without dispute, that of Vionville, Mars-la-Tour, fought on the 16th of August, 1870, and that of St. Privât, fought on the 18th of the same month, and in the two the Germans lost in killed and wounded a greater per cent. than the French. According to the figures given in our staff history our loss in the first battle was 16,000 men out of 80,000 combatants; and in the second 20,000 men out of 210,000: that is, on the first day a fifth, and on the second a tenth of the combatants. In all the subsequent battles and combats the proportion of loss was much less.

We see, therefore, that the greater the improvements effected in the arms used in warfare,—the greater their range,—the less bloody the battles become.

In saying this I state nothing but what you already know. The fact is so well known, so universally recognized, that more than twenty years ago the inventor of a new fuse claimed, in the preface of the work in which he described his invention, that it was a benefit to humanity because it was an improvement in military fire-arms, and that the more they were improved the less bloody the battles became.

When, in presence of these historic facts, I hear it stated that by reason of recent improvements the effect of artillery shrapnel fire has increased so greatly that in less than 15 minutes one of the armies engaged will necessa-

rily be annihilated, I feel constrained to examine more closely into the reasons why combats have become less bloody as the range of firearms has increased and their fire has become more exact,—more deadly. Perhaps in so doing I shall find some reason which will force us to admit that the recent improvements in our arms may bring about a totally different result.

The chief result brought about by the inventions which enable us to fire at great ranges will be that the fighting will begin at great distances. The long range combat once terminated we pass, if fortunate, to the close combat. But if the result of the long range fighting makes it plainly evident to one of the parties that he will not be successful in the close combat, the great distance which separates the two armies will permit that one to withdraw from the struggle with the greater part of his force or even with his whole force. The greater the distance separating the armies the more easy it will be to withdraw at the proper moment, and this for the fractions of troops engaged in certain special phases of the struggle as well as for the whole force engaged.

At the time when the short Rôman sword was the principal arm of the troops, combatants could not be separated when once they became engaged in the *mêlée*. Only the annihilation of one of the parties put an end to the fight.

In 1870 projectiles were thrown to such great distances that Bazaine on the 18th of August could commence his retreat with his whole army without being inquieted, even after St. Privât had been taken by assault, that is, after his position had become untenable. It was only in the village that there was a *mêlée* properly so called, and there the defenders were wholly destroyed,—were all killed or made prisoners.

Possibly you will require that a properly handled artillery should not open fire at distances too considerable, but should endeavor to bring about the decision promptly, at shorter ranges, that is, that it should at once endeavor to engage in the artillery duel, which can be terminated in 15 minutes at 2200 yards with shrapnel; for if the infantry be not allowed to expend ammunition uselessly in firing at long distances, neither can the artillery be permitted to do so.

My personal experience enables me to reply to this as follows:

No one more than I would blame the artillery for opening fire at too long ranges. In my paper of the 18th of March, 1869, which has already been mentioned, I stated that a decisive result could be expected only when the artillery fired at distances less than 2000 paces, but that at distances greater than 2500 paces only a prolonged cannonade would result, while to fire at a range of 4000 or 5000 paces would be a useless expenditure of ammunition. When the war broke out in 1870 I directed the batteries placed under my orders to avoid as much as possible opening fire at a distance greater than 2000 paces. Shortly afterward we received the order from the chief of artillery of the army not to fire at greater ranges than 1800 paces.

I was firmly resolved to carry out these instructions when, on the 18th of August, I reached the battle-field, and my batteries hastened to approach the enemy to the distance at which the artillery fight would be decisive. There was great rivalry among them, at the moment when the

Guard corps began to take part in the action, as to which should first fire upon the batteries which the enemy had pushed forward at first upon the sloping plain before the position of St. Privât. What happened? These advance batteries withdrew into the interior of the position, and the forward movement of my batteries was arrested by strong lines of skirmishers pushed far to the front, of which I have already spoken, which, with their 3000 chassepôts, commanded us imperiously to advance no farther.

Here we were then at the foot of the slope, and the enemy's artillery with which we should first engage was distant 2200, 2800, even 3200 paces. What was to be done? To advance was to come directly upon the enemy. To draw back—to draw back with a line of 54 pieces (the battle began at this point with this number), had been to announce that at this place the battle was lost to us. To remain without firing and allow ourselves to be fired upon by the enemy's infantry and artillery would have been insanity; it would have required of the cannoneers a tenacity and a courage more than human. There was nothing else to do but to open the fight at these distances in spite of my own determination and the order of my superior.

The originator of the order, General von Colomier, came riding through my batteries during the artillery combat, and I made my excuses to him for having opened fire at these great distances, showing him the strong lines of skirmishers we had before us. He approved my action, and warned me against moving forward heedlessly, telling me that almost all of the corps artillery of the IX. Corps had just been very roughly handled at the right of the forest of Cusse, and warning me to avoid such a catastrophe on my part.

The situation was then stronger than our will.

It was only after the action became more general and the infantry took part in it, that we could choose positions at shorter ranges.

Upon the whole front of the battle the artillery became engaged at these same distances. The grand artillery line of the First Army at Gravelotte found itself 2500 and even 3200 paces from the enemy's positions, and General von Dresky tells us in his letter upon the position he occupied on that day that the range at which he fired upon the enemy's batteries was 3300 paces.

It is not absolutely just to compare the artillery with the infantry.

It is true that we require of the infantry that it should not open fire too soon when it takes the offensive, but we require this only when our artillery can open fire upon the enemy against whom it advances. At the present time no one will require of the infantry that it shall march in open field without firing a shot to within 550 yards of an enemy's infantry which is yet intact and which occupies a good position. On the contrary, we reached the conclusion, in my "Letters upon Infantry," that during its advance the artillery should be charged with the duty of protecting it with shrapnel fire, and that if no artillery were available, other infantry troops should protect it by volley firing at a range of about 1100 yards.

The artillery, by means of its fire at long range, can facilitate the advance of the infantry and enable it to approach near to the enemy without

having to open fire, but it is not possible to exchange these duties, for the rifled musket of the infantry will not carry farther than the rifled cannon of the artillery. There exists for the artillery no other arm which has a greater range, and it must itself furnish the long-range fire, under cover of which it will, at the proper moment, approach to the distance at which it can engage in the artillery duel with the greatest chance of success. Besides, the artillery is not affected by the principal reason which obliges the infantry to husband its ammunition during the offensive. It is impossible for the ammunition wagons to follow the infantry during an attack, while, on the contrary, the artillery can replace exhausted ammunition even during the cannonade.

Imagine us engaged in one of the numerous actions in which I have taken part, with this single difference that the distance at which a cannonade formerly led to no result, is now that at which the decisive artillery duel takes place, which should lead in a quarter of an hour to the annihilation of one of the two parties.

I cannot see how it will be possible for the artillery, in the offensive, to delay opening its fire until but half an hour before the moment when infantry is to open its skirmish fire at 550 yards from the enemy, and yet begin the fight at a distance of 2200 yards.

The infantry cannot traverse the distance that it must pass over in order to arrive within 550 yards of the object of its attack without halt, and as it would make an ordinary march. It must advance deployed in skirmish lines—pushed in a wide front against obstacles of every kind—perhaps advance by rushes—and the greatest distance that it can be supposed to traverse in this manner in half an hour will be but the half of that it could make in ordinary marching—say 1650 yards.

At the moment therefore when the artillery should begin the duel at 2200 yards, and a half hour before the skirmish attack that should follow immediately, the infantry should be not more than 2200 yards from the enemy, that is, at about the same distance as the artillery. How can the two arms approach so near to the enemy without opening fire—to the enemy whom we must suppose provided with the same arms, and who could consequently cover them with a hail of shrapnel from the moment when they had approached him within 3800 yards? Would the infantry hold steady under such a fire? Would not its leaders indignantly exclaim, "For what have we artillery if it cannot divert this fire from us? Forward with the artillery and open fire."

Should the artillery abstain from firing until its own infantry, decimated by the fire of the enemy's batteries, ceases its forward movement, and the attack consequently fails?

Or should the artillery, alone, precede the infantry until it is 2200 yards from the enemy and then begin the struggle?

In the first place this would be acting contrary to the principle under discussion, for it would then open its fire more than an hour before the moment appointed for the skirmish lines to commence the attack with their fire.

Then again it may be questioned whether the artillery, unsupported,

would be able, generally, to post itself at first so near the enemy. It is an exceptional case in which a terrain will be found which will permit of a march under cover until but 2200 yards from the enemy. The defensive position which permits it will have been very poorly selected, and every time that it does occur, and that it is possible to approach the enemy's position so nearly without discovery, the assailant will be tempted to carry it at once by assault. But if some places upon the line of approach can be effectively reached by the enemy's shrapnel fire how can the artillery advance against these pieces which fire without being disturbed, as tranquilly as in target practice? If, besides, there are obstacles in the terrain commanded by the enemy along the front of the advancing artillery line, the immediate movement forward to a distance of 2000 paces will become wholly impossible.

For greater clearness let us return to the situation at the battle of Königgrätz which has served in my preceding letter as a base for my suppositions.

Let us suppose that the defender has posted his artillery upon the heights of Lipa as far as the height "733" west of Langenhof, that is, generally speaking, along the road from Lipa to Stresetitz. He has destroyed the bridges over the Bistritz and we assume that the river rolls with the same considerable volume of water as on the 3d of July, 1866. The shrapnel of the defender carries 3800 yards, consequently as far as Zowetitz, the Sadowa brick-kilns, and Kopanina. The assailant advances from Klenitz and makes a front attack. We may assume also that the wings of the two artillery lines are prolonged by other troops.

How can the assailant's artillery succeed in occupying a first position 2200 yards from the enemy?

It cannot cross the Bistritz, for the bridges have been destroyed and the line of the river is commanded by the enemy's shrapnel fire. The infantry must first take possession of this line. But will the infantry detailed for this operation succeed in crossing the last 500 yards which separate it from the Bistritz, exposed as it will be to the enemy's undisturbed shrapnel fire? If the effect of shrapnel fire be so deadly as the results obtained on the practice ground make them appear, do you believe that it can accomplish this task? I think not. The only course left will be to post the batteries upon the mount of Roskos and near to Mzan so as to open an artillery combat and to engage the enemy's batteries with shell so effectively that he will be compelled to withdraw his attention from the infantry. This will not prevent single batteries from seeking positions under such cover as may be found, as, for instance, behind the brick-kilns, or by the side of the little wood near the sugar refinery, in order to open fire with shrapnel and thus to increase the effect produced by the shell. In view of the great distance separating the two artillery lines it could very easily happen that an hour or more would pass before any result would be obtained. Even a much longer time would elapse if we were not successful in obtaining the range promptly.

I said in a preceding letter that, judging from the tables of accuracy obtained on the practice ground, it was probable that the defender could

reach with his projectiles from Lipa, the highway as far as Dub, with such an effective fire that the infantry marching by this route must cease the advance in column, and that then the situation of this infantry will imperiously require that an artillery line should engage the batteries at Lipa. Hence it will perhaps be necessary that the assailant's artillery should take position at Dub before posting itself upon the mount of Roskos. We must finally acknowledge then that the artillery of the assailant must fire for two hours or two hours and a half before his infantry can think of seizing the Bistritz and re-establishing the bridges.

Here again the force of circumstances will absolutely prevent our putting into execution our firmest intention to await, upon principle, the moment when we can begin the artillery duel at 2200 yards.

The logic of facts brings us to conclusions wholly different from those indicated by the most correct theoretical deduction.

We now come to the strongest argument against the proposition to open with the artillery only at distances less than 2200 yards, and then to engage immediately in the decisive artillery duel which must begin but a half hour before the infantry opens its fire.

Who will guarantee that a decisive result shall be produced in fifteen minutes? Is there a certainty that the artillery will be able to find the proper range at once? Could it not, perhaps during a half hour or more, fail of the mark while believing that it reached it?

In times of peace the artillery has much practice, and follows a very simple system for regulating its fire. It is so easy to observe the effect it produces. When the smoke of the bursting shell covers the target the range is too short, and when the target is seen in front of the smoke the range is too great. The third, fifth, or at farthest the seventh shot must strike the mark. This is what many an artilleryman has said in observing the firing on the practice ground.

But in war the terrain in the first place upsets all the calculations of the battery commander. If before the target there is a hollow of no great width which is not apparent from the battery, and in which the bursting shells are not immediately seen, the escaping smoke dissipates in rising and shows the target so clearly that the observer believes it to be behind the target, and that his range has been too great. When one of these depressions is found 500 yards in front of the target the battery commander could be mistaken by at least 500 or 600 yards in the distances between the shot which went over, and the one which fell short, and consequently throw away all his ammunition in pure loss. I have witnessed a practice firing in peace time in which one of the most experienced professors of the school of firing continued firing in this manner at a range 500 paces too short. In action I have seen a considerable line of artillery, beside which I was posted, fire for a long period at too short a range, until finally I discovered it and caused the error to be corrected. The enemy upon which it was firing had established his batteries upon the farther edge of a plateau; in the middle of the plateau was a hollow, and the artillery, misled by the deceitful appearance of the smoke, believed that the enemy was posted upon the edge of the plateau nearest it.

There are other means of observing the effect of the shots. The captain stations himself upon a flank of his battery, with his field-glasses in hand, and with such cover from the wind as he can find. Supposing his station to be on the left wing he will know that all shells bursting on the right of the object fired at must have fallen short, and those bursting on the left must have passed over. That is simple and easy. But it happens even in peace times that a gunner aims upon the wrong target (the enemy being represented by a line of pieces) and when this happens the captain will necessarily be deceived in the result, and will arrive at conclusions wholly false.

But in action the observer has to struggle with yet many other obstacles.

It may happen that the smoke of one of the enemy's cannon hides the smoke of his own shell, and consequently he does not see the explosion at all. If the enemy be fired upon from several directions he will perhaps mistake a shell from another battery for one of his own, and will draw a wrong conclusion, and will fire many shots upon wrong data. After a time the mistake will be found out and then he will begin again from the beginning. But during this time the fire of the enemy will have become more intense and he will have obtained the range of our guns. Our observer endeavors to observe a shot, but the smoke of one of the enemy's bursting shells passes before his glasses and veils the sight,—perhaps dims the glass. He cleans it with his glove and orders another shell. At this moment his horse becomes wild with fright because of a shell bursting near him, and he considers himself happy not to have been thrown, though the shell was lost. Then another shell falls in the midst of a team and bursts, and the horses take the bits in their teeth and throw themselves upon him just as he is endeavoring to observe the effect of the next shot. The enemy's shells fall more and more thickly in the battery. His men show themselves a little agitated. They aim with less accuracy, and consequently his observations are no longer of any value.

These things happened to me personally at Sedan where I had posted the first two batteries of the corps artillery. They were behind a hedge, and some trees which I hoped would hide our position from the enemy. But our first shell burst in the branches, just in front of the pieces, and therefore it was necessary to cut the trees down, and that consumed a quarter of an hour. Then all the incidents enumerated above took place, and, taking it altogether, the enemy made it very uncomfortable for us. The only possible course left to take was to cause the firing to cease along the whole line; to give directions anew for the pointing; and then to fire salvos from each of the batteries so that the simultaneous explosions of the six shells would furnish reliable data upon which to regulate the firing. This crude fashion of obtaining the range proved to be very effective, but he who had proposed it, Colonel von Scherbening, was just at that instant even, killed by a shell. We commenced to make good practice, the enemy no longer fired with coolness, his fire ceased to do so much execution, and very soon we held the upper hand. More than an hour had passed before we had been able to attain this end.

The distance was, if I am not mistaken, as much as 3100 paces, or 2600 yards (the artillery counted by the geometric pace of 29.5 inches, and not by that of 31.5 inches, which the regulations now prescribe for the infantry). We were then very nearly at the range considered as most favorable for the deadly artillery duel which it is now thought will lead to a decisive result in a quarter of an hour.

After our artillery line had silenced our opponents I rode to another battery to see whether it was making good practice, and, being in that state of mind which leads one to interfere prematurely, called out to the battery commander: "Captain, you have too great an elevation." The Captain smiled and replied that his pieces were still not sufficiently elevated. I showed him then the smoke of a bursting shell far beyond the enemy. "That was not one of my shells," was his reply, made in a very positive tone. I then gave him a positive order to fire at 500 paces less range. He did so and I saw he was right. I left him the control of the firing and in a little while he found the correct range. What struck me particularly was that he did not look toward the object aimed at, but only at his battery, he being upon its flank. I asked him why he proceeded in this manner, and he replied: "The one-year volunteer Klopsch follows the flight of each shell. He passes from one piece to the other as they are about to fire, places himself where he is sheltered from the wind, and after each shot makes me a sign that I understand." You see there are various methods of obtaining the range. If each battery had a man gifted with sight as piercing as that of Klopsch, obtaining the range would be an easy matter.

No receipt—no precise rule—exists which can always be depended upon. There is but one thing to recommend, and that is to acquire the facility by actual practice, and the rules given at the school of firing furnish only a useful foundation.

It was a very poor consolation for me to find that my batteries and I were not the only ones to commit such errors in regulating their fire during the war.

I have just said how I myself saw a neighboring line of artillery fire for a long time at too short a range, and General von Dresky writes what follows upon the action of August 18, 1870:

"It has happened to me to meet with an interesting experience which proves that it is possible to be deceived in the observation of the target, in spite of field glasses. This is what happened: It seemed to us that the four French batteries upon which we first opened fire on the 18th of August, which had taken position before Montigny-la-Grange, were behind embrasures cut in a garden wall. We saw but the flash of the discharge and these without doubt came from loop-holes, and at these we aimed. Two days later we visited this point and ascertained that the batteries had actually been stationed in advance of the wall, for it was there that we found dead artillerymen and horses, and splinters of wood; while we found that no loop-holes had been cut in the wall, and that what we had taken for embrasures was only the effect produced by branches of trees hanging over the wall. The distance from this place to the position we occupied on the 18th was about 3200 paces (consequently at least 2600

yards). The terrain had been ploughed in all directions by our shells, and if we did actually cause considerably loss to the enemy's batteries it was because they were placed too near the wall, and because our projectiles scattered more or less, to say nothing of the fact that we had expended a very considerable amount of ammunition (about 1200 shells)."

I could tell you of other high officers of artillery, well trained at the school of firing, who have told me of similar experiences, but I have not asked permission of them to publish their names, and, furthermore, I believe that what I have already told you will suffice.

You will find it wholly natural that it is not so easy to regulate the firing at a range of 2200 or 2700 yards if you consider that 2200 yards makes a little more than a quarter of a (German) mile, and that 2700 yards makes a third of a mile.

Place yourself upon an eminence, and fix upon a point distant a quarter or a third of a (German) mile. Imagine to yourself a village there behind an undulation of the ground or behind a hedge where you see the flashes from the cannon, the shells from which reach you, and that these flashes are all that you see of the enemy; that you begin to fire your trial shots, and that, while observing them, you are constantly disturbed by his shells. You cannot be astonished if, under such conditions, you commit errors, or have to observe for a quarter of an hour, or even during an entire hour, before obtaining the range. In any case, you must agree that it is impossible to count with certainty upon being the conqueror in the artillery duel in the space of fifteen minutes from the moment the first shot is fired.

But what will you do if the artillery duel at 2200 yards or 2700 yards does not bring about the hoped for result? Or, further, if it constitutes a check to your artillery?

The general commanding will act upon the assurance that you have given him in regard to the issue of the conflict. He will calculate that the artillery duel will take a quarter of an hour, and that you will then employ a quarter of an hour in cannonading the enemy's infantry. If the general conforms to the ideas now current, he will say to the Chief of Artillery: "You have half an hour in which to perform your part, at the end of that time I will be with my skirmishers so near the enemy as to mask your fire." At the very moment when the Chief of Artillery opens fire at 2200 or 2700 yards, the infantry, which has until then been held at the same distance from the enemy, where, under cover, of course, it takes the attack formation, commences its advance. At the end of half an hour it finds itself 500 yards from the enemy's infantry.

But what if the artillery be deceived in its anticipations; if it has not yet succeeded in bringing an effective fire upon the enemy? The infantry then, if it has succeeded in advancing so far under such circumstances, finds itself, at the moment when it masks the fire of its own artillery, in the face of the enemy's intact position and loses heavily, not only by the fire of the enemy's infantry, which is far from being overwhelmed, but by that of a part at least of the enemy's artillery. The catastrophe is yet more inevitable if the assailant's batteries have been silenced in the artillery duel instead of being victorious.

In this fashion the artillery, if deceived in its calculations, will not only have exposed its infantry to decimation, but will itself be in danger of destruction; and this result will have been brought about by its postponing too long the moment for opening fire—by its determination to open the artillery duel at distances not greater than 2200 or 2700 yards—and by its belief in its ability to bring about a favorable result in half an hour.

In view of this danger, the general commanding will not give his approval to such a risky combination; above all, if he has once proved, at his own expense, how dangerous its execution is. He will order his artillery to occupy that of the enemy, so as to turn its fire from his infantry, and, this duty being accomplished, to prelude to the infantry attack at the moment when he wishes it to be executed.

Hence it follows that in future we will proceed as at present with the artillery combats except that the ranges will be greater.

At first there will be a cannonade, and I understand by that the comparatively ineffective fire we are obliged to open to draw upon our artillery the attention and the projectiles of the enemy's artillery, or to prevent it from embarrassing the advance of our infantry. I have heretofore explained that in view of the present range of the pieces, circumstances may require that we begin this cannonade at a distance of 5500 yards or more.

Then the general commanding will fix upon the point at which he will execute the first attack. As soon as he shall have settled upon his plan of operations the artillery will advance to the extreme limit of shrapnel range (about 3800 yards), and, opening an artillery combat with shell, will endeavor to silence the enemy.

When the general finds that his artillery is overcoming that of his adversary, he will be able to fix upon the instant when he will cause the attack to be made.

Then only will the artillery be able to engage in the decisive duel with its fire. It will advance by échelons, profiting by any cover the ground may offer, and continuing its fire.

If the result of this duel be to silence the defender's artillery, then the moment will have come for the general to move forward his infantry, which, formed in the order for attack, has been awaiting the order to advance. It can then reach the enemy but a half-hour after the artillery duel has ended.

While the infantry is advancing this distance of 1700 to 2200 yards, the artillery will cover the enemy's infantry with a hail of shrapnel, always following up its infantry by échelons, as I have said to you in my "Letters upon Infantry."

The increased range of our pieces, therefore, makes it a necessity that we should not delay, longer than in the past, the moment for opening artillery fire, but that, on the contrary, we shall be constrained to begin the fire sooner even than we do now.

Whether we wish it or not, this cannonade will last a longer time. That is to be expected; for the farther an arm carries, the greater the distance at which we will open fire with it.

I maintain nevertheless, what I heretofore said, that it is not permissi-

ble to begin a useless cannonade at too great ranges, while if the enemy commits the foolishness of thus throwing away ammunition we may rejoice at it without imitating him. But if the adversary in acting thus actually reaches us, then we must reply and fire also.

Through the improvements in the construction of our pieces ranges will still increase, and the distances at which we now only waste ammunition in firing, will in future be those at which the decisive result will be obtained.

This is why the artillery combat will necessarily begin hereafter at distances at which heretofore there could be no question of it.

On the other hand, the improvements in the arms used in warfare will cause battles to become less bloody. For if one side be overpowered in the artillery combat outside of effective shrapnel range, its leader will be able, three times out of four, to evade the decisive struggle, by reason of the fact that he is still 3800 yards distant from his adversary.

SOME RUSSIAN IDEAS ON FORTIFICATION.*

(Reprinted from the *Naval and Military Magazine*, London.)

In the present day the science of fortification, like that of naval tactics, is in a problematical condition. There has been a superfluity of theory without the requisite modicum of practice; and in both cases the contest which is in progress between artillery and armor plates seems to have introduced the prevailing element of doubt. On the sea this cannot be set at rest till a collision has taken place between two great maritime powers; and on land the next great war, whether in the East or West of Europe, will instruct us as to the value of armor-clad forts. These, as is well known, have been constructed in great numbers, by France on her eastern frontier, and by Belgium to close the valley of the Meuse to an invader. In Roumania, again, they are in course of erection along the banks of the Sereth, also around Bucharest; while quite recently a writer in a German periodical has recommended a line of cupola forts stretching from the Baltic to the Austrian frontier, in order to cover the necessarily slow concentration of the Russian armies. General Brialmont, the distinguished Belgian engineer, is the premier champion of armor-clad mechanical defenses, by means of which he hopes to reduce the strength of standing armies both in the field and in garrison. His opponents among continental writers are numerous; they remark that the General, from a too exclusive contemplation of his own branch of the service, has forgotten that it is subsidiary to the rest, and point to the undoubted fact that a nation must principally rely for security on the numbers and courage of its living defenders. For what Power will first begin to reduce its armies and put its trust in passive defense? Only the weakest, while the strong will take advantage of the adversary's folly. The idea includes the same funda-

* *Mittheilungen über Gegenstände des Artillerie- und Genie-Wesens*. May, 1890. *The Engineer Journal*. St. Petersburg, January, 1890.

mental defects as other projects for general disarmament which have preceded it.

Among those who assume a position diametrically opposed to Brialmont is Lieutenant-Colonel Velitchko, of the Imperial Russian Engineers. Starting from the assumption that a concentrated fire of artillery *en masse* is even more decisive in sieges than in the open field, he maintains that this must be obtained by increased mobility, not by burying guns in casemates or cupolas. Cupolas, he admits, may certainly in the course of time be perfected to the extent that they will be made proof against bombs and other implements of destruction; but it will be at the cost of their efficiency; the cupola at this stage will have become a "dark, damp vault, enveloped in masonry and iron, and loaded with complicated machinery; it will have lost its uses and degenerated into a huge and costly plaything." It will be impossible, he judges, for armor to keep pace with the growing powers of artillery, and some other means must be devised to oppose it. These means, to anticipate his conclusions, he professes to find in the living defenses of the country; in other words, in suitable infantry positions taken up in the intervals between the detached forts, which will, supported by a concentration of mobile artillery, thus play a subordinate instead of a leading part in the general scheme of defense,

Among other things, Colonel Velitchko advocates the substitution, wherever possible, of concrete (*beton*) for armor-plating. Concrete has only $\frac{1}{16}$ the resisting power of iron, but then its expense is only $\frac{1}{10}$ of the latter. Ten metres of concrete cost no more than 5 c.m. of iron, while 3 m. afford bomb-proof shelter, and it takes 20 c.m. of the metal to secure this advantage. This material must also, he insists, be used instead of wood for gun-platforms. The biggest melinite bombs used in the experiments at Bourges merely worked a funnel of 30 c.m. depth and 1.20 m. diameter in this material. This funnel may be easily repaired with sand and cement, or it may be temporarily covered with an iron plate.

The casemate can only be used for flanking purposes in the counterscarp of ditches, where it remains protected from the besieger's fire. The writer, however, does not approve of Brialmont's proposal for flanking batteries, which consist of a concrete wall of 3 m., covered by an iron roof of 24 c.m., which is supported by iron pillars. The embrasures are too long to permit of the ditch being thoroughly searched; they may easily be obstructed by broken fragments of concrete; the whole structure would be injured and shaken by every bomb which falls on the iron roof; the edges of the latter are not sufficiently strong, etc.

The massed fire of artillery can never be replaced by that of a smaller number of guns, though these be the better protected. Montalembert recognized this truth, but placed his artillery in casemates because its locomotive powers were in those days extremely small. The various European Powers followed the letter but not the spirit of his doctrines, and vast casemates were in consequence reared. Carnot endeavored to restore to the defense its forfeited superiority, not by augmenting passive resistance, but by a more rational distribution of the works, frequent sallies, and the free employment of the vertical fire of mortars. Todeleben perceived the futil-

ity of the gigantic casemated barracks of Sebastopol, and at once surrounded them with earthworks. He it was also who first adapted their trace carefully to the locality, armed the covered way with artillery, and connected the intervals between forts by trenches, thus availing himself of mobility and concentration of artillery fire. The rage for cupola turrets has arisen and subsided in the twenty years which have elapsed since the Franco-German War; already the French are in despair about their forts on the eastern border, and the writer thus casts their horoscope: abandonment, demolition, or reconstruction. It is stated that their aim becomes so wild when they have been subjected for some time to fire, that the percentage of hits on shots fired sinks from 60 or 70 to 6.

In recent years turrets have certainly become dearer, though scarcely better. The author holds that the acknowledged incapacity of armored turrets to resist direct fire has led to their being hidden from sight beneath earth or concrete: for example, Schumann's disappearing turret for quick-firing guns, and Bussière's sinking turret, which are both worked by hydraulic power. But even Brialmont has rejected all mechanisms worked by steam or hydraulic action as too complicated and expensive; though on Sorriot, or Souriau's turret he has bestowed an unqualified approval in these words: "at last a type has been discovered which, requiring nothing but manual labor for working it, hardly differs in cost from ordinary turrets." The Russian colonel describes this fabric as "an armor-clad ship on dry land." It floats in a reservoir of water, and thus can be elevated or depressed at will by four men using as many levers; it is in brief, a "colossal buoy," to have recourse once more to nautical terms. Velitchko, however, is not satisfied with its properties; elevation and depression is effected too slowly; it requires a gross depth of 12 m.; the water in the tank will soon become foul, and the slightest leak will empty it; the axis of the system is too unstable for a correct aim to be taken after firing; and the shock of a hit on the iron structure, being communicated to the water, will tend to burst the sides of the vessel. In 1888 a Belgian captain, Van Choberek, received a prize from the Jury of the Brussels Exhibition for certain improvements in the above system, which afford greater stability to it.

Mougin's "oscillating tower" ends the category which is exposed to Colonel Velitchko's destructive criticism. This, too, belongs to the "disappearing" class, and its duck beneath the surface of the ground is effected by the whole fabric oscillating on a horizontal axis passing through the centre. In the loading position, the muzzle is below the surface, and it is lifted into the firing position by means of a windlass. After the discharge, the reaction of springs sends the platform back into its former position. The defects of this system are that the carriage, being one with the turret, will not resist without injury the impact of bombs which strike the iron roof, and the same may be predicted with regard to the horizontal axis on which the whole system works.

Finally, the writer arrives at the conclusion that no turret has yet been invented which corresponds to the requirements of the case, and—a somewhat sweeping assertion—that one never will be. The modern reliance on

passive defenses has given birth to plentiful vagaries. Mougin would garrison his forts with mechanics only; Schumann requires not a single rifleman for his; Sauer proposes a fortress to consist of a triple girdle of iron turrets, each containing twenty gunners and mechanics. In Germany there are engineers who dream of movable fortresses to be transported by rail from the eastern frontier to the West, according to requirements. In France, however, the mania for iron forts is cooling down. Systems of defense must be accommodated to the indestructible truth that the science of artillery is constantly progressive.

A Russian officer advocates, in the *Engineer Journal*, the extensive use of fougasses in the defense of forts. The tendency will show itself in the future to attack these works by open storm without awaiting the formal proceedings of a siege. The crowning of the glacis being no longer a condition precedent to the final assault, the assailant cannot be forced to engage in subterranean warfare, and therefore the forming of countermines may be safely left till he has declared the intention to do so, and only on fronts threatened by his approaches. On the other hand, they should all be armed with fougasses, laid during the period of mobilization, in order to co-operate with the rifle fire and artillery in repelling a sudden attempt or *coup de main*. These would be bored beneath the glacis at a depth to which no shell could penetrate and fired by electricity from within the fort. It is recommended that two rows of fougasses be laid, because, if the first explosion fails to create a panic among the stormers, a second always succeeds in effecting this object. The engineers should place small sticks or tufts of earth not noticeable to others immediately above the mines, that the look-out sapper on the rampart may signal the exact moment for his comrade who controls the galvanic wires to fire.

Another writer in the same journal, on "Hasty and Leisurely Field Fortification," emphasizes the fact that, in modern campaigns, frequent combats or "chance encounters" are sure to take place between the advancing columns of hostile armies prior to the decisive battle which settles the fortunes of the war. In such cases, he lays down that "hasty" fortifications are applicable, as one or two hours, or perhaps only a few minutes, may be available for the purpose. But the trenches thus thrown up should be susceptible of enlargement and adapted to the requirements of "leisurely" executed field-works, which the general action may bring into use.

THE GERMAN CAVALRY IN 1889.

(From the Revue Militaire de l'Etranger.)

Translated by Bvt. Major-General S. W. CRAWFORD, U. S. ARMY.

THE campaign of 1866 in Bohemia, originated a progressive movement which has brought the German cavalry to its present status. The regulations of May 5, 1855, then in use, and which continued in force until 1873, were greatly complicated, and their application to varied ground difficult. The principles laid down for the handling of masses of cavalry were rudimentary. Add to this, that in Prussia, after the campaign of Schleswig-Holstein, and the war of 1859 in Italy, as elsewhere, the opinions expressed upon the diminished usefulness of the cavalry had evoked a certain echo, and it is not surprising to see this arm to a great extent unused in the Bohemian campaign.

A German military writer characterizes the rôle of the cavalry in 1866, as follows: "Marching with difficulty in the rear of the army, suffering in consequence from an insufficiency of forage, this mass of 14,400 horses rendered relatively but little service. In no case was it upon the ground at the point when its action would have been of the greatest benefit, so that at the close of this short campaign, the cavalry attached to the infantry divisions were almost completely exhausted. This fraction of the cavalry had been made to perform all the duties of protecting the army, of reconnaissance, and of action upon the field of battle. It is evident that the cavalry attached to the divisions of infantry alone were called into play necessarily in a restricted sphere. The ultimate success attained could not warrant such an employment of mounted troops. All of the military writers beyond the Rhine were prompt to recognize the fact that, as a whole, the rôle of the Prussian cavalry in 1866 had greatly diminished, if compared with that which it played in the last century. Its relative superiority in face of an adversary who risked nothing would not modify this view of the case."

Prussia did not fail to profit by the experience acquired in the Bohemian campaign. One definite conclusion might safely be drawn from the latter events, and it was this: That if the adoption of arms of long range had modified the rôle of the cavalry, the principles upon which its action depended had not changed. It became necessary then, and at once, and at the very beginning of a campaign to restore the cavalry to its place in front of the army. All felt that now, that it was freed from the infantry columns which had paralyzed it, it was called upon to discharge, on a far larger scale, the duties which the cavalry attached to the divisions of infantry had formerly undertaken, and to which it had been unequal.

"Since 1866," says a German military writer, "when the Prussian cavalry was handled with such incompetence, everything has been changed in that arm. This has been the work of the arm itself. The true principles of its being have been gradually restored. We find in fact this remarkable result, that only now, after a series of experiments, numerous tentative

efforts, and a fierce dispute, they have taken up the thread where the First Napoleon dropped it."

The writer adds "The war of 1866 taught the following lessons :

(1) It showed the difference between the employment of the cavalry of the *corps d'armée* and the independent cavalry.

(2) It proved that the best unit for the independent cavalry is that of the division.

(3) It established the fact that the independent division should on principle be placed directly under the orders of the commander-in-chief of the army." From this the formation of grand units of cavalry would follow, and in consequence the necessity of training in the management of these units. But during the short time which intervened between the campaign in Bohemia and the events of 1870 Prussia had only time to decide upon the new way in which she proposed to launch her cavalry. Her regulations did not undergo any modification. The manner of employment had changed, but the mechanism remained.

In Germany the majority of military writers considered the war of 1870-71 as furnishing conclusive evidence of the beginning of a new era in the history of the cavalry.* It was a conclusion somewhat exaggerated, and no doubt drawn from the fact that the Germans were successful. They had returned purely and simply to the methods in use at the beginning of the century—those which were in force in the armies of the First Empire. Yet it must not be forgotten from the peculiar circumstances of the case that the test was incomplete, the German cavalry having been able, without interference, to develop at ease its system of reconnoitring.

The divisions of cavalry had not only regained their independence and sought in advance of the army the active participation which had devolved upon them; but were employed in reconnoitring at great distance from the brigades of the corps which had alone performed this service in the Bohemian campaign.

The war of 1870-71 only served to confirm the Germans in the opinion, that since 1815 the principles which should have served as the basis for the employment of cavalry had been called in question, and that this arm of the service in imagining that its proper rôle might be annihilated by the improvements in firearms, was wholly in error.

General Carl von Schmidt was among the first to oppose this fatal impression and to demonstrate that the cavalry was capable of the same improvement as the other arms of service.

"If we cannot improve our arm, like the infantry, by technical inventions," said he, "let us turn our attention to moral and intellectual reforms. The object to be attained may be briefly stated, as address, mobility, military fitness, rapidity, independence and speed."

The studies of Gen. v. Schmidt helped to break the old mould in which the cavalry had been, as he termed it, "crystallized." In his instructions he indicates the course to pursue. The reform of the existing regulation affects the first line. Rapidity of movement demands simplicity in the

* *Militär Wochenschrift*, June, 1876.

method, and mobility is the reward. The cavalry having become entirely independent of the other arms, should sustain itself, and to accomplish alone all the duty or service required of it. Hence the necessity of providing it with the long range arm. In short, the rapidity of movement as well as the necessity of speedily crossing open spaces of danger, compels the reduction of the weight of the saddle and equipment, to be borne by the horse, to the strictest minimum.

According to Gen. v. Schmidt, these were the principles which the cavalry could not disregard in attaining the highest degree of efficiency in the field.

It soon became necessary to alter the regulation for the military evolution, but it was with wise deliberation and great prudence that the Germans decided to interfere with the tactics of their cavalry. A provisional regulation of January 9, 1873, abolished all useless field movements, altered others, and inaugurated a new departure in the management of large units of cavalry and their tactical uses in war. It was the first step taken in regulating the use of masses, and it was left to time to familiarize those interested with the new principles. At this period the military literature of Germany abounded in criticisms upon the principal operations of the cavalry in the late war, and these criticisms bore mainly upon the weakness of the effective forces engaged.

Provisional as it might be, the improved regulation of 1873 became definite in 1876.

That which defines the regulation 1876 is the recognition of the normal constitution of the division and the adoption of a normal order of battle.

The division of three brigades is considered as the established type, and, if the regulations are silent upon the constitution of these brigades, they nevertheless permit it to be assumed that the division will comprise one brigade of heavy cavalry and two of light cavalry or dragoons.

The German military writer we have already quoted, thus expresses himself upon the constitution of the independent cavalry divisions.*

"In the organization of cavalry, all other considerations must give way to the demands of strategy. In view of this the Second and Fourth Divisions in the last war were the best organized (they comprised the brigades without fire arms, and those armed with carbines). But, as the principle of the unification of the cavalry which involved the instruction, armament and organization of that arm, was not utilized in the German army, the composition of the independent divisions competent to meet the strategic exigencies would remain an unsolved problem. As far as the cavalry was concerned one essential quality was demanded; it must be available for strategical as well as tactical uses, as an independent body, or as a *corps de combat*, and thus regarded, there was no difference between the cavalry divisions and the cavalry of a *corps d'armée*, and hence it was essential that all of the cavalry should be equally instructed and prepared for all the demands made upon it, whether for the charge, for long raids, or for fighting on foot.

The German general officers in the war of 1870 and 1871 had become

*Ueber die Bewaffnung, Ausbildung, Organization, etc.

convinced that cavalry when provided with firearms was freer, more independent, and the result of that conviction was the organization of the cavalry divisions as is hereafter described. It should be remembered that at this period more consideration was given to strategical than to tactical dispositions. "Our arm," said Gen. v. Schmidt, in his reflections upon the employment of the independent cavalry division "is to be employed in future wars as it was in the last campaign; because of the opinions indorsed by the army chiefs; opinions, that afterward were transformed into principles; and for the reason, too, that our generals and the entire army have derived the greatest advantages from this mode of employment of the cavalry, and because, too, it is precisely this rôle which is most suitable to our arm, which renders it more useful and doubles its moral value. We have then to fulfill the same mission in the future as in the past," and the General adds, "to make strategic reconnoissances and to protect the troops which it covers. These are the two obligations which devolve upon the cavalry division."

With a programme so clearly defined, it remains only for the German cavalry to settle its organization and to establish tactical rules which will insure the success of its strategical operations.

Since the cavalry was called to operate in front of the army, which was its essential rôle, it was obliged above all other considerations to engage the enemy's cavalry upon this special ground.

After having restored the tactics of the line, the regulations of the 5th of July, 1876, prescribed what should constitute a normal formation for battle sufficiently flexible to allow of a rapid deployment in all directions, and to insure at the same time uninterrupted action as well as concentration.

The division operating far in advance of the army in its search for the enemy, was supposed to be completely scattered. Upon this point General von Schmidt thus expresses himself in reference to the distribution of the component parts of a division of cavalry on the strategic front of an army:

"Two brigades march in the advanced line; each of them place one regiment in the first line; these two brigades cover a front of from 30 to 44 kilometres; each regiment occupies a space of 15 to 22 kilometres. Each one of these regiments disposes in the first line of two or three squadrons and keeps the remainder formed in close order in the second line in rear of the centre of the first. The squadrons in the first line form a special advance-guard and remain constantly connected with each other. Each regiment in the same way is in connection with its neighbors. In each of the two brigades of the first line the second regiment follows the first; it is usually placed in rear of the first regiment at a distance of about 3500 metres. Behind this line at a distance of 7500 metres is stationed the second brigade which forms the reserve."

In case of an engagement a division so disposed upon an extended front has from necessity to concentrate with rapidity and to face the enemy in an order unusual to it.

The brigades, forming the several lines, were indicated rather by circumstances than by the formal order of the commanding general, and

hence the regulations of 1876 laid down the principle that a division of cavalry in "order of battle" should form in three lines of equal strength.

As to the engagement itself, the attack of the division was to be made "in order of lines." The first line giving the first shock to the enemy, the second line covering the first and supporting its movement by a flank attack, the third line forming the reserve.

In view of the cavalry tactics, as determined by the regulations of 1876, Major von der Goltz thus writes in *La Nation Armée*:

"The formation in three lines was believed to be the true one: one for the shock, a second for the support, and a third for the reserve. A single regiment is too weak to produce a vigorous shock; three regiments are too difficult to handle. The formation of the lines with brigades of two regiments into four squadrons is no longer used.

"It is essential that all of the lines should be of the same strength, as it cannot be anticipated which one will be used for the attack, which for the manœuvre or the support, or which of them will be held in reserve to strike the decisive blow, or to remedy a temporary check.

"The tactics of the three lines actually adopted in the German cavalry have this essential advantage, that the role assigned to the second or third line may without hesitation be equally assigned to any one of the three." As a consequence of the convictions resulting from the experience of the war of 1870-71, and in reference to which General v. Schmidt had become the most earnest advocate, the cavalry had adopted a normal order of battle for the division; the brigade in some manner constituting the great tactical unit of this formation. As to the course to be followed in battle, it may be thus tersely expressed: "Attack upon the front combined with an attack upon the flank."

Since this period, however, these views have undergone a singular modification in Germany, which seems to have adopted an entirely different plan. The tactical employment of the cavalry arm appears to have absorbed to its profit the almost exclusive interest which was formerly taken in the strategic operations. That, in thus modifying its views, Germany had not lost its interest in its cavalry, is abundantly proved in the regulations for field service published in 1887. It would appear as if the desire was to give to the cavalry a larger sphere of action in battle, while it was evident that its strategic action would end very speedily in an engagement.

"The more the military forces of Europe are systematically organized," says an author already quoted, "the more the means of defense will be varied and numerous; the more the cavalry, above all if it has in its front a cavalry equally well instructed, will be hindered from observation. Prompt and extended movements will be undertaken with difficulty, and its action, which is supposed to be purely strategical, will change immediately into tactical action, or battle, in which it will disengage itself equally on foot or mounted."

Subsequently, in speaking of "battle," the same author, after an extended commentary upon the operations of the cavalry on the fields of Königgrätz, of Custoza and of Vionville, renewes the criticism so often made upon holding the cavalry systematically in reserve for the close of the

action. He holds that if actively employed in the battle they can be dispensed with for the pursuit, and he maintains that the result of their employment in battle exceeds in importance that of the pursuit, and he attributes to the non-employment of cavalry until after the action, "the great want of success upon almost every modern field of battle." Major v. der Goltz, in discussing the pursuit and prompt use of victory, had always remarked that the "immediate pursuit" was scarcely ever resorted to in the late wars, and he added, "The character of the modern battle is opposed to its employment."

Many other military writers in Germany have revived the line of thought which after the Bohemian campaign, and also after the events of 1870-71 had led the cavalry to consider its rôle upon the field of battle as nearly ended. Since 1883, Major v. der Goltz whose opinion we have cited upon the subject of the pursuit, wrote in the "The Nation in Arms:"

"The cavalry aspires again to play a decisive rôle in battle, as formerly, when Seydlitz attacked at Kolin, at Rosbach and at Zorndorf. The hope which it cherishes arose from certain crises in the great infantry combats during the late wars. Often the lines of skirmishers were seen to give way under fire, to become thinner, to scatter, to spread out and break in their effort to turn the enemy. The forces, exhausted in proportion as they advanced through the grain-fields, having manœuvred and made long marches in close columns to cross the fields; their ammunition exhausted, many officers fallen, were no longer under command. It was then that many who witnessed this scene inquired anxiously what would be the result if now a large body of cavalry should appear upon our flank and pass like a storm over the field? It would sweep away without difficulty every vestige of the infantry."

At the battle of Vionville when it began to grow dark, and when scarcely any infantry was visible over the vast plain, but a great mass of artillery only, of more than 100 pieces, without protection, the same thought suggested itself. It was considered impossible to check a body of cavalry which should throw itself resolutely upon these batteries. This was one of those opportunities when all of the cavalry yet disposable should be thrown upon the enemy."

Without assuming to decide the question, Major v. der Goltz concludes in these terms:

"It is possible to obtain these results with masses of cavalry in battle, but experience has yet to show whether they can be maintained in sufficient numbers to be considered as a new factor, changing the present mode of fighting."

To Prince zu Hohenlohe* the experience appears to be conclusive: he says, in speaking of the charges made by the brigades Pulz and Berjanowics upon the division Bixio and Prince Humbert at Custoza: "This cavalry charged upon the body of skirmishers, broke through some squares and spread a panic to the most distant lines. The attack was made after seven o'clock in the morning. At eleven, and at four o'clock the two

* "Lettres sur le cavalerie."

Italian divisions under the demoralization to which these charges had early subjected them, remained still in advance at Villafranca, immovable as if under the influence of a spell."

Upon the whole, the current of opinion which gives to the German cavalry an important tactical rôle in future wars increases more and more. This is plainly marked by the modifications which the publication of the regulations of the 10th of April, 1886, have caused in the regulations of 1876. All traces of exaggerated formalism have disappeared from the regulations now in force in the German cavalry: the division *type* of six regiments and the normal formation for battle have been abolished, and the composition of large bodies of cavalry is left to be determined by circumstances.

During the late war, the divisions were as we know of very variable strength. One division (the 5th) numbered nine regiments, while another (the 3d) had but four. A like inequality between units filling the same rôle appeared to be unjustifiable, and led the Germans to adopt the division of six regiments. This standard conformed logically to the tactics of the lines such as they were then laid down in the regulations of 1876. To-day the division of three brigades of two regiments is to be considered as an expedient only, and not as a normal type. The composition of large units of cavalry will, in the future, depend, without doubt, upon the immediate duty which is assigned to them; as well as the exigencies of the service, which place in the hands of the same commander the different units scattered upon the same front of operations, and finally the ability of the officers assigned to command them.

The regulations of 1886 in considering the formation in three lines, or rather in three échelons, as the one to be generally adopted, lay down, as the first principle in the fight of cavalry against cavalry, the absolute necessity of making such dispositions as will assure, before all else, the victory of the first line. "The first line," says the regulation, "forming the head, inflicts the principal stroke upon the enemy; it is necessary then to make this line as strong as possible so that its strength should insure success. It is essential to confront the enemy with a first line stronger than his own. In most cases, it is necessary to place in the first line, the half at least, of the disposable squadrons that are left."

The cavalry is thus looked upon as a true arm of surprise marching to the conquest of its adversary both materially and morally; at the first onset it should insure the preponderance in the attack, for it is essential before all other considerations that the enemy should have no time to rally.

The German tactics have long assigned the duty of insuring success to the third line or the reserve. The part borne by the reserve in the cavalry engagements is different from that in the engagements of infantry—if the victory should in the latter case belong to the force which in the last resort disposes of a unit of infantry in close order, the Germans consider that, in the engagements of cavalry, success will belong to that side who resolve from the opening of the action, and without hesitation, to sacrifice the greater part of its force in a vigorous attack. In order to increase this necessity, the regulation assigns to the second line a rôle which almost merges it in the first. "The second line should by its action arrest any

retrograde movement of the first line; it should march directly behind it with one portion of its squadrons at grand intervals, while with the principal portion it will flank either one or both of the wings. The flanking fractions form the protection of the flanks of the first line."

The first line, freed from all anxiety for its flanks, has then but one object: to destroy by a violent onset the disposition of its adversary.

The third line, reduced in numbers to the strictest necessity (the 16th of the forces of the division), is designed to confirm the success of the action.

The regulation examines, without considering it as an exceptional attack, the charge against infantry. More earnestly than in the fight against cavalry, it urges simplicity as to the mode of action. "In a well-formed infantry, the front and the flank are equally strong against cavalry, consequently, in choosing the point of attack where the ground does not decide, it is oftener the better course to take the shortest route."

It is in the formation of several lines by which cavalry will attack infantry, and it is by repeated strokes that it will break its resistance. In view of this the regulation considers that the first line may be broken by the different attacks it makes, but it is the mission of the lines which follow to strike successively the points which have resisted the first shock. In regard to an attack upon artillery. The regulations admit purely and simply a direct attack against the front: the cavalry forms itself in two lines, the first in one rank. It is this line which will serve as the object of the artillery fire.

The second line, formed of compact squadrons, will follow directly with large intervals. It is this which will be the true line of attack.

The results of the employment of the cavalry in Germany have been greatly simplified, as it appears since the late war, and particularly since 1876, the date of the publication of the preceding regulations. The regulations of 1886 maintained that success was more to be anticipated by a strong direct attack upon the enemy's front than upon evolutions, always complicated and slow of execution, which would lead to a flank attack. It is doubtless for this reason that the regulations lay it down as a principle that the cavalry should always charge "*sur un grand front et d'une maniere enveloppante.*"

The present tactics of the German cavalry are no other than those of the great Frederic. The regulation of 1876 was already imbued with the spirit of those tactics, and the regulation of 1886 had almost adopted its forms. Without desiring to impose upon its cavalry the rôle which devolved upon it in the battles of the Seven Years' War, it is fair to conclude that Germany, in future battles, will assign to it a more important rôle than the one it performed in the late war.

We have described the general sentiment in accordance with which the regulations had been modified—our Eastern neighbors do not appear to rely upon them. The tactics of the infantry and artillery have been simplified and revived. To-day the regulations of the 10th of April, 1886, upon the cavalry drill, although relatively recent, become the oldest in date, and it is to be presumed that they will be shortly submitted to other modifications.

It is generally admitted that there is yet something to be done in simplifying these tactics (the half column, for example, scarcely ever employed in the manœuvres, is destined to disappear); that certain tactical requirements have not been sufficiently generalized; it is necessary to leave more independence to the commander, in short, it is indispensable to destroy the last vestiges of formalism which may yet remain.

In regard to its armament the German cavalry is in a state of uncertainty. The lance, which it is contemplated to generalize, is on trial in many of the regiments. Whether it is destined to become the arm of all the cavalry is not yet determined.* Meantime this arm is greatly praised on the other side of the Rhine: the place upon the field of battle to which it is desired to restore the cavalry is one of the strongest reasons that is used to secure the general use of the lance.

In an article upon the armament of the cavalry recently published in the *Militär-Wochenblatt* of the 20th of July 1889, we find this sentence which marks pointedly the tendencies which we have above noted. "The cavalry ought to be convinced that it has the best possible armament, so as to deploy upon the field of battle the maximum of material and moral force, and to find itself in a position to go even to the support of the infantry. It is to attain this double object that Germany increases the number of her lancers, and that she has given the carbine to all her cavalry. The German cavalry is convinced that the lance is the true arm for the field of battle."

If those in favor of the lance are numerous on the other side of the Rhine, all of the military writers are not meanwhile agreed as to the special type of the arm that should be adopted, and still less as to the way in which this arm should be distributed to the different units of cavalry. It may readily be imagined that the decision anticipated will have a great influence upon the modifications yet to be adopted in the modes of combat.

However this may be, a very strong tendency to unification in the German cavalry may be remarked, and it will not be long before its armament is definitely decided upon. The remodelling of the regulations will be the necessary consequence of this action.

In any case it may be concluded from these successive evolutions in the opinions formed, from the modification in the estimate of the rôle of the cavalry in battle, that it is the evident intention of the Germans to make in future wars the largest possible use of this arm, as well tactically as strategically.

* Adopted since.

Military Notes.

ARTILLERY PRACTICE CAMP AT OKEHAMPTON.

THE artillery practice camp at Okehampton now occupies so conspicuous a place among the military institutions of the country that a review of the work done there from year to year seems necessary in the interests both of the artillery and of the army at large. Have the lessons taught by the experience of last year received practical application during the progress of the present shooting season, and have any fresh questions been raised for determination either in regard to the tactical employment of artillery in action or to technical matters of purely artillery concern? First, then, as regards the experience of last year, recent reports from Okehampton show that the lessons taught have been carefully learnt and are now being systematically applied. Batteries reach the practice-ground ready to begin to shoot the day after arrival. Preliminary drill is learnt beforehand. It has not been possible to watch the conduct of different batteries at Okehampton this year without feeling that the utmost pains have been taken by their commanders to train their men in fire discipline before reaching the camp. It is now exceedingly rare to find officers interfering in details which ought not to concern them when all ranks have been instructed beforehand in their duties. The functions of commander, second in command, subaltern officers, sergeants, layers, and other working members, are now clearly defined beyond possibility of confusion. From the word "action" to the words "cease fire" each individual in the battery has a distinct duty, or rather succession of duties, to perform; and according to the degree of perfection which is reached by each during the preliminary instruction, so will the united results of the whole battery be correspondingly successful when tested by actual shooting. A battery of artillery now works like a machine—a self-acting, living machine, set in motion by its commander, and kept moving by the regularly directed action of each unit maintained in due gradation through all ranks. Drill, however, is only a means to an end. Has the shooting improved? We quote from the private letter of an artillery correspondent: "The results this year are most encouraging. Firing at 3150 yards at a small infantry target of fifteen dummies, in five minutes every man was hit more than once. This and similar shooting go to show that we can force infantry to deploy and hide their faces at least 1000 yards before we come under their effective fire. With the 12-pr. gun, if the layers are quick and accurate in using Colonel Scott's sight, there is no difficulty in finding the range in five or six, or even in fewer trial shots. We found shrapnel with percussion fuse most effective. When in action against some guns the camp commandant

suddenly ordered us to fire at a cavalry target on our left flank, and gave us five minutes to do what we could. We picked up the range (2700 yards) and put fifteen shell into the target in the time allowed, disabling every man in the group. Probably half-a-dozen shell would have sufficed to beat off the attack. It is easier to shoot at moving targets than when they are stationary, because the target is more easily visible, and the fuses can be rapidly shortened as the enemy advances. The difficulty at Okehampton is to see the targets, as the dummies are purposely concealed as far as possible in order to make the practice more real. This difficulty would disappear in a real battle. The 12-pr. shrapnel shell is a most terrible man-killing projectile, and it is impossible to exaggerate the effect which well-directed artillery fire must have in the next war." Infantry officers who have visited the camp this year corroborate the above opinion, and agree that the effective power of modern guns has increased *pari passu* with that of rifles. As regards the future, the question of range-finding and the supply of ammunition are the two points uppermost in the minds of artillery officers. With regard to the former a correspondent says:

"There is some disappointment at the range-finding school at Aldershot because battery commanders do not use their range-finders, or value their services, as much as might be wished after the trouble taken to instruct them. The real fact is, the gun fitted with Colonel Scott's sight is so accurate and rapid a range-taker that in nine cases out of ten a battery commander prefers to trust to his guns rather than to the report of his range-taking non-commissioned officers. The average time taken this year at Okehampton by the range-takers exceeds five minutes, half of which time should be enough for any battery to range itself by trial shots. A great deal of power is employed on range-taking. Each battery has to give up one officer, at least two of its best non-commissioned officers, and three horses, for a purpose which artillery officers apparently do not set much practical value on. Questions of this kind settle themselves. The only *raison d'être* of range-finders is to assist the battery commander. If he finds he can range his battery quicker with his guns than with his range-takers the question must at once arise whether the power diverted from the shooting strength of the battery to range-taking is not wasted, and whether the practical results are commensurate with the great expenditure of time, labor, and money spent on this object. German artillerists will have nothing to say to range-takers. I am not satisfied that they are not right, and that we in England are not wrong." Before expressing a definite opinion on such a matter, it would be better to await the report of the camp commandant at Okehampton, who has had special opportunities this year of observing the range-takers at work, and who will, we are confident, be able to form a sound judgment as to their practical utility in the field. No useful purpose is served by hasty criticism. As regards the service of ammunition, the opinion seems to be gaining ground that, whenever possible, ammunition should be supplied direct from the wagon bodies, the limbers both of guns and wagons being moved away to a safe place directly the battery comes into action. The gun-limbers should be kept as a last reserve, with full boxes and fresh horses, ready for an ad-

vance to the next position. If this system be finally approved, wagons must always be accustomed to be brought into action simultaneously with the guns. Gun and wagon should never be separated. This is a new departure, and one which must have an important bearing on future artillery tactics. The advantage of bringing up the wagons and unlimbering them in rear of the guns is that in the space of a few seconds every horse is taken away from the fire which the guns are certain to draw when once in action. The alternative method of serving ammunition from the gun-limiters and unhooking the horses meets with general condemnation from artillery officers. Certainly, in our view, unhooking horses under modern fire does not sound practical. On this point we shall again await the camp commandant's report with interest and expectation. With reference to tactics, it is now more than ever settled that the battery is the unit for fire and manœuvre. Six guns with their wagons are as much as one man can bring into action and control with his own hand and voice. For purposes of organization, batteries are collected by threes into brigade divisions; but it cannot be too clearly understood that the purpose of the brigade division is for organization only, and not for drill and manœuvre. The colonel of artillery who in the next war tries to play the part of a cavalry brigadier, and heroically lead his three batteries into action, will lead them to certain destruction. The conditions of cavalry and artillery fighting are absolutely different. For artillery fire effect so much depends upon the local circumstances of the ground selected that each battery commander must reconnoitre his own ground and personally bring up his own battery on to the actual position where he is going to fight his guns. Such drill movements as are now practised at Woolwich and Aldershot—long advances of many batteries in line and deployments from deep columns—are unreal, unpractical, and misleading. For our part, we should wish to see what is known as precise drill limited to the battery, and any attempt to combine batteries together for drill movements forbidden. As soon as the fire discipline of a battery is perfect, and as soon as it can drill steadily under its own commanding officer, drill should cease and instruction in manœuvre begin. While battery officers have derived much benefit from their experiences at Okehampton, the superior officers of artillery do not seem as yet to have grasped the functions which the next war will require them to perform. Those functions will be to keep in constant touch with the general officer commanding the force, to ascertain his plans and changes of plan, and instruct battery commanders accordingly. These instructions should be limited to indicating the general positions to be taken up, the target to be fired at, and when a change of target or position is desirable. To perform this rôle properly requires close and keen observation of the progress of the fight, which it is impossible for an artillery colonel to follow if he is incessantly interfering with the executive conduct of battery commanders and concerning himself with petty details of no real significance. Here we must leave this question, but not without congratulating artillery officers upon the tremendous strides recently made both in shooting and fire discipline. With a gun of unrivalled power, with a thoroughly serviceable equipment, and a highly trained personnel, they may

now look forward without anxiety to taking their share, if required to do so, in the next European war. It only remains to express the hope that those officers and men who have been instructed during the past three years at Okehampton may continue to serve with that branch of the artillery in which they have now been trained, and that the folly—for it is nothing else—of transferring them on promotion to a totally different sphere of work may no longer be perpetrated. After all, the last word will always depend on organization, and until the organization of the Royal Artillery is remodelled on intelligent principles it is hopeless to look for continuous improvement either in shooting or in that tactical training which is essential to secure the full effect of modern artillery fire.

ENGLISH CAVALRY MANŒUVRES.

In the *Times* of Tuesday appeared a most practical and common-sense letter from a French cavalry officer on our Cavalry Manœuvres. The writer came over, he tells us, to learn something, imagining that a horse-loving people like the English would have their cavalry in the highest state of efficiency. Having reached Aldershot, the first thing that struck him was the absurdity of our selecting an infantry general to direct the operations of a cavalry force. "Not in France, in Germany, or in Austria," he says, "would such a command be intrusted to a general belonging to another arm." And he goes on to inquire: "Can it be possible that in your nation of horsemen you have no general capable of manœuvring and instructing two brigades?" But, as the letter we published last week from a military correspondent clearly showed, there are others besides this gallant "Sabreur" who are astonished that the English cavalry should have been subjected to such an unmerited slight. Having given vent to his feelings on the subject of command, our foreign critic goes on to discuss some of the details of our system. Here we had best, perhaps, let him speak for himself:

"Now, I saw upon the parade many fine horsemen and horses; but their organization is a thing that puzzles me, and upon which I can get no explanation. I see one splendid regiment of Horse Guards, mounted upon magnificent black horses, in three squadrons of 150 horses. It is the only regiment on a Continental scale in the field. But, side by side in this same brigade, I see two regiments of Hussars, one of which has not more than 200 horses; and the soldiers appear very young, almost boys. I ask: What is your organization of cavalry? What is the strength of the units of regiments and squadrons? No one can tell me. I see one regiment of 600 horses, in three squadrons of 150; alongside, another regiment of 200 horses, in three squadrons of 70. The Horse Guards' regiment is not a permanent regiment as now constituted. It is composed of officers, men, and horses of three regiments; and to form this one fine regiment an officer tells me that 'the cream has been skimmed off the whole Household Brigade of Cavalry.' But yet you are a practical and economical nation as administrators, and you dislocate a whole brigade and take three regiments with its cadres of officers and staff (*petit état-major*) to form one regiment. In France, as in Germany, there is an effective strength of 700 horses in

each regiment, of which 600 go to the field in four squadrons, the fifth squadron remaining in barracks as a depot to supply casualties. In the 2d Brigade at Aldershot all the regiments were weak in numbers, and none were of equal strength. There was one splendid corps of Lancers, as far as appearance went, which I took for a strong squadron, but a colonel told me it was the whole regiment. I say to him, 'Half the regiment is left at home?' He replies, 'On the contrary, every available horse is on parade, including horses of four years old, some of which have been less than six months in the regiment.' I was told it was the same in the Dragoon and Hussar regiments! Horses of four years old! In Germany no horse under seven takes part in manœuvres; and in France, by the recent law which will add 7200 horses to the establishment, no horses are to be counted on the effective strength till five years old, and will not go to manœuvres until six. I ask: Is it good economy to work these young horses? Will they have force to stand the fatigue? Will they not always bear trace of it? Or is it that we on the Continent are mistaken and that horses of four and five years old are mature, with their bones hard, and their muscles and tendons well set and developed in strength? I do not think that we are mistaken."

"Sabreur," having delivered himself in the above very forcible terms on the question of organization, proceeds to deal with other matters of interest. He evidently does not "fancy" Colonel Hutton's ideas in regard to mounted infantry. "He expected," he says, "to see infantry soldiers on little horses or hill ponies;" his surprise was great when he found the men mounted on trained cavalry chargers. To sum up his impressions of this new arm, "they carried long rifles, did not wear boots, and rode indifferently;" and he expresses a doubt as to the probability of either France or Germany following our lead. But one of the most important points touched upon by this evidently qualified critic is our arrangement for mobilization. Our peace system may be a most faulty one. This would not matter much if things were so ordered that for the purposes of war we could bring together a force which would be able to compete on fair terms with any troops with which it might be called upon to cross swords. Are matters so ordered? What has "Sabreur" to say? We will again quote his own words:

"Seeing so many regiments with small effective, I ask how on mobilization the necessary men and horses would be obtained. The answer is a doubtful one. A few hundred men who in bygone years have served in the cavalry are on the strength of the Reserve and may be available. As to horses the omnibus and cab horses of London are under contract to be handed over. A thousand thunders! The famous British cavalry to consist of men who have lost the habit to ride, and mounted on the broken-down horses employed in trades! Perhaps, in this case, the mounted infantry is more suitable. At all events I prefer our Continental system with regiments maintained in peace at war strength, and with an effective of horses not under five years old. It is not considered that a Reservist who has left his regiment more than a year is fit for cavalry; and in case of mobilization he serves in the train."

It is well that we should sometimes see ourselves as others see us. It was only last week that one of the highest military authorities in the country was telling the good Cutlers of Sheffield how much progress we had made of late years in the direction of army reform. The British army, according to this distinguished officer, was never in such a splendid condition as it is to-day. Lord Wolseley has had a great deal to do in creating the present system, and he may be excused for thinking better of it than others do. The letter of "Sabreur" will serve a useful purpose if it only induces those in authority to recognize the fact, unpleasant as it may be, that the system which we have built up is not perfect, and that we never can make it so as long as we pursue our present policy of underrating the value of regimental opinion. What "Sabreur" has been telling the British taxpayer through the columns of the *Times*, British cavalry officers have been saying among themselves for the last twenty years. But they have been given no voice in the direction of affairs. The lamentable condition of unreadiness to which our cavalry has been brought is one of the results of our false administration. There is not one word in all that this foreign critic says which can be objected to. It is outspoken, honest, and valuable criticism, and it is entirely in accord with military as opposed to official opinion.—*Army and Navy Gazette*.

RUSSIAN IDEAS ON FORTIFICATIONS.

This interesting topic is continued in the June number of the *Mittheilungen über Gegenstände des Artillerie und Geni-Wesens*. The necessity, in modern siege operations, of combining the practice of masking artillery with the utmost degree of mobility is dwelt upon. High-angle fire has been carried to such a pitch of perfection that it is no longer indispensable to get a view of the object aimed at. Hence the necessity of masking guns by means of a parapet about three yards in height; indeed, a second one is sometimes added, or a screen of brushwood, trees, etc. If the enemy can be led into error as to the assailant's position, so exact is modern fire that he will drop his projectiles one after the other quite harmlessly on to that limited area which it represents, and, especially since the introduction of smokeless powder, it will not be possible for him to correct his aim by observing the discharges of the hostile artillery. Formerly this was not the case, for the very imperfections of artillery caused projectiles to spread laterally to such an extent as to preclude the hope of securing by masking. Finally, no doubt, the enemy will find out the true position; but then the principle of mobility must be invoked; the defenders will shift their batteries to another locality, which they will retain till once more discovered. Thus the armor-clad siege batteries proposed by General Brialmont will not be called into requisition. Todleben first conceived that the defender's line of fire might be developed by the use of batteries intermediate between the girdle of detached forts, protection being assured by a covered way and glacis uniting the whole circle. The heavy ordnance he would have located in the batteries, the forts being garrisoned by infantry. But his recommendations were not accepted; the heavy guns remained in the forts, which were plated with armor, this kind of protec-

tion constantly growing more expensive and complicated. Various historical examples of the advantages of masking guns are cited. At Belfort, a cavalier 21 m. high, presented a huge mark for the fire of the attacking party. A masked 24-pounder mounted on it contended against the enemy's artillery during the whole of the siege, and only ceased fire when it had become unserviceable from the number of shots discharged. Of these it had fired 5000, having received 60,000 in return from the besiegers, who were unable to ascertain its exact position. At Plevna, we learn, the Turks usually removed their guns from the redoubts during a bombardment, placing them in a masked position outside. The interior of a fort is compared to a gigantic "shell trap," an admirable target for the besieger's batteries and especially for his mortars. Batteries for the direct attack should therefore be stationed in the intervals between the forts, those, however, for flanking purposes in casements within them; the former to be masked and enabled to change position when the enemy's fire becomes too hot for them to stay. Colonel Velitchko, the author of these reflections, is of opinion that detached forts should be looked upon as "pivots" for the protection of the heavy ordnance in their intervals; the forts to be connected by means of a glacis and covered way, behind which a *chaussee* or railway runs for the transfer of guns to the right or left. The glacis should be masked by plantations of trees, which should not strictly follow its outline, the batteries to be dug in the glacis or constructed 100 or 150 paces behind it. Small permanent batteries, containing at least four guns a-piece, to replace those which formerly conducted the direct attack from the forts, should be built at favorable spots, and should be provided with casemates and magazines. Disappearing gun-carriages should be used. The article is a long one: the above are the chief points urged on our attention.—*The Illustrated Naval and Military Magazine*.

ARMY PROMOTION IN ENGLAND.

A French paper claims for the French army that it has "the youngest colonel of all the armies of Europe in the person of Colonel Paul de Benorst, of the 17th Chasseurs, who succeeds to the command of his regiment at 43 years of age." Our French contemporary evidently is not posted in the details of the English army, or it would know that there are several officers in command of British regiments who are under 44 years of age. In the cavalry at the present time we have Colonels Douglas-Willan, 1st Dragoon Guards; Lister-Kay, 2d Dragoon Guards; Amyatt-Burney, 3d Dragoon Guards; Grant, 7th Dragoon Guards; Bibbey, 4th Hussars; Harvey, 5th Lancers; Verelst, 11th Hussars; Wardrop, 12th Lancers; Spilling, 13th Hussars; Beck, 15th Hussars; Davison, 16th Lancers; Gough, 18th Hussars; French, 19th Hussars; and Graves, 20th Hussars; and in the infantry—Laye, 1st Scottish Rifles; Courtenay, 1st Royal Sussex Regiment; M'Causland, 1st Welsh; Sparkes, 1st Derbyshire; McCleverty, 2d Derbyshire; Bayly, 1st Royal West Kent; Partridge, 2d Royal West Kent; Ravenhill, 1st Shropshire L.I.; Knox, 2d Shropshire L.I.; Wade-Dalton, 2d Middlesex; Studdy, 2d Manchester; Essex, 2d Gordon Highlanders; Barnard, 2d Royal Munster Fusiliers; and Kerr, 1st Royal

Dublin Fusiliers—all under 44 years—surely a good sprinkling of young officers to represent the British service. It has long been the aim of the War Office to create a system which would give us young and vigorous officers to command regiments. In this it has succeeded.

SIR:—I notice in your issue of Sept. 27, a paragraph summarizing some calculations I made concerning promotion in the Royal Artillery based upon regulations since altered. These calculations were made last year. At that time it was to be expected that a large proportion of the majors of 1884, 1885 and 1886 would accept half-pay promotion on concluding seven years' service in that rank. Most of these officers would be brought in again in their proper rotation, and would thus cause the block in promotion which you quote. But now the conditions are altered, so that it is no longer necessary for these majors to take their promotion exactly at the conclusion of seven years or not at all, but they may defer it until such time as it may suit them to apply for it. The effect of this is, that whereas formerly any major of the above period who might by any chance reach the age of superannuation (48 or 50 years) would take the promotion to save himself, and many, if not most of the others, would take it to avoid wholesale supersession, it is now likely that very few will wish for it with the consequent exclusion from regimental employ. I have therefore lately sent to the Royal Artillery Institution another forecast, in which I estimate that, instead of rapid promotion for a few years and then a block, there will be slower promotion throughout, tending to increase the periods in the ranks of major, captain and subaltern from 8 years, $7\frac{1}{2}$ years, and $8\frac{1}{2}$ years, as at present, to 10 years, $9\frac{1}{2}$ years, and 10 years five years hence, and to 9 years, 9 years, and 12 years ultimately, when increased age will cause more rapid retirement amongst the senior majors. The number of captains and subalterns have been largely increased during recent years. The present junior subalterns have consequently a prospect of much slower promotion. The senior subalterns commenced with fewer above them, and have gained much by the augmentation of the captains. I have thought it more satisfactory to send you this explanation, so that your readers may not imagine that your quotation refers to my most recent calculations.

I am, etc.,

EDGAR KENSINGTON, Lieut.-Col.

Royal Military Academy, Woolwich, Sept. 27.

—*Army and Navy Gazette.*

Comment and Criticism.

(The remarks under this head have, generally, been invited by the Publication Committee, which desires that as far as practicable these "Comments" should appear under authors' names.)

I.

"Meritorious Discharged Soldiers."

Gen. Henry L. Abbot, Colonel Corps Engineers.

THE paper on this subject by Mr. Bloom, in the September number of the JOURNAL, raises questions which must attract the attention of every one interested in the improvement of our military system. How to check desertion has been discussed of late from many points of view, and modes have been suggested looking to securing a better class of recruits, increasing the physical comforts of the soldier, reducing his discomforts, restricting arbitrary exercise of authority on the part of officers and non-commissioned officers, providing readier modes of obtaining an honorable discharge when desired, etc. If it were practicable to make service in the Army a stepping-stone to desirable civil employment after discharge, I think an inducement to good conduct would be offered more powerful than any which has yet been tried. In sober truth we all know that complaints against Army life are rarely well grounded. The men in general are well fed, well clothed, well treated, and should be content if only an attractive future were open to them when they wish to marry and quit the colors. At present there is none. His good Army record counts but for little in popular estimation, and too often the old soldier must subject himself to the senseless tyranny of the "walking delegate" before he can hope to earn an honest livelihood.

I think, therefore, that our thanks are due to Mr. Bloom for his suggestion that some mode be sought by which officers can aid deserving men in obtaining in civil life suitable rewards for distinguished Army service.

Whether such a plan as he has outlined can be carried into effect in this country, is in my judgment, to say the least, doubtful. Under any circumstances, I think efforts should be restricted to the Regular Service; for too long a time has elapsed since the Civil War to make the plan applicable to our ex-volunteers, and the organization and character of service in the National Guard are too unlike those of the Regular Army to warrant an attempt to include both in one system.

I long ago suggested, but thus far without success, the trial of a plan to aid deserving ex-engineer soldiers in obtaining civil employment under Government; based on a system now in successful use by the Royal Engineers of England. Extensive civil and military works are usually in progress under charge of our Corps of Engineers. The habits of discipline, and much of the special training of the soldiers of the Battalion of Engineers, admirably qualify them for the duties of foremen and mechanics on such works. At present, however, the officers in charge have no ready mode of learning the names and qualifications of the discharged soldiers. A Quarterly State-

ment of duties, addresses, etc., is distributed regularly from the Headquarters of the Corps to all the officers, and no doubt a properly prepared list of deserving ex-soldiers would be added if requested. I think benefit to worthy men and good to the Service would result. The Quartermaster's Department employs great numbers of mechanics and laborers; and if supplied with such lists from the different regiments similar advantages would be extended to the other arms of service.

Although new in this country such a plan is not new abroad, and its success there places it beyond the sphere of untried experiments. The plan adopted by the Royal Engineers is the following: The *R. E. Journal* is printed monthly at Chatham and distributed throughout the Corps. This paper contains a "Register of Discharged Non-commissioned Officers and men of Royal Engineers wanting employment." The list contains for each name, the age, number of years of service, whether single or married, (and if the latter the number of children), the trade or special qualifications, and the character expressed in graded language. Great care is taken to make the latter statement trustworthy, all officers of the Corps being requested in a paragraph following the names to look over the list and to communicate to the Secretary of the R. E. Institute (who has charge of the publication), confidentially, anything they may know for or against the men seeking employment: "remembering that every good man who obtains a situation will probably open the road to several others; but, on the other hand, every bad man employed brings the agency into discredit, and therefore closes the market against a number of good and deserving men." The August issue of the *R. E. Journal* contains twenty-seven names on the list, and four good positions were obtained during the month. Correspondence with the agency is conducted through the "Secretary, Discharged R. E.'s Employment Registry," (probably a non-commissioned officer) "Care of the Adjutant of the School of Military Engineering, Chatham."

It is always well to begin experiments of this character on a small scale, and I see no reason why such lists may not be prepared and distributed at the different regimental head-quarters, and be made good use of by officers having occasion to employ civilian labor. The plan at least promises better results for our Service than the more ambitious organization of the Corps of Commissionaires. Indeed it appears that a recent attempt to establish a branch of this corps in Australia with a view to provide employment for old soldiers retired from service in India, has failed. The unemployed in the Colonies are supposed to look with disfavor upon the organization. The Trade Unions in this country would doubtless take similar ground against establishing such a corps here; but they would be powerless against employment by the Government in the manner suggested.

Bvt. Brig.-Gen. Thomas M. Vincent, Asst. Adjutant-General, U. S. A.

In this era of progress, a recruit should not be permitted to enter the Army, unless he shall have become identified with a community, and be vouched for by its respectable inhabitants.

Thanks are due to the author of the article: "Meritorious Discharged Soldiers," as published in the September number of the JOURNAL. Thoughtful attention should be extended to the article by all who are interested in the welfare of the Regular soldier, suggestive, as it is, of a Corps of Commissionaires, wherein the honorably discharged soldier would be received, and provided with means of gaining a livelihood in civil life. The publication is particularly valuable and timely, in connection with the present efforts of the Government to induce worthy young men to enlist.

As the meritorious discharged soldier is inseparably connected with the character of the enlisted force of the Service, the subject naturally leads to the starting point—

entrance to the Service. If worthy young men do not enter the Service, it will be very difficult to find a personnel adapted to the proposed end.

That a bad element—the deserter class—formed of repeaters, wanderers, tramps, floaters, skippers, nuisances, etc.,—unreliable men who were never stable in civil life, and who enlist simply as an expedient to bridge an exigency—is found in the Service, is beyond dispute. It is there notwithstanding the great care of recruiting officers in making enlistments; care is exercised, as indicated by the rejections, during the fiscal year ending June 30, 1889, of over seventy per cent. of the entire number of applicants for enlistment. The bad element is not inherent in the military service, but an offspring of civil life. And if encouragement in civil life is to be extended to the soldier after his discharge, it is reasonable to claim from civilians an honest effort which will assist in keeping the class from which desertion springs out of the Service, so that, thereby, enlisted men of character will have secured to them increased contentment; also that men of high character—those who can be vouched for—will be induced to enter the Service and advance its standing and dignity. It is needless to add that the loss and injury to the Service from desertions, other than from the tramp class, is a trifle. Until recently, under the interpretations of law (Supreme Court Reports, Vol. 6, 1886), a civil officer could not, in the absence of a military order, arrest and restrain a deserter, and the law seemingly favored the deserter. But now, through the Act approved June 16, 1890, United States Marshals and their deputies, sheriffs and their deputies, constables, and public officers of towns and cities, can apprehend, arrest, and receive the surrender of any deserter from the Army, for the purpose of delivering him to any person in the military service authorized to receive him.

But while the law does not any longer favor the deserter, civilians, generally, do not view desertion as a crime; and the views of the people may be considered as expressed by the *New York Times*, in the autumn of 1884, as follows:

"Desertion in time of war, especially desertion in the face of the enemy, is a mark of cowardice, and is therefore held by everybody to be ignominious. But a soldier who deserts in time of peace is taking the only way open to him to be rid of a bad bargain.

* * * "A breach of contract made by an enlistment is no more disgraceful than the breach of the contract made by an agreement to serve a specified time in a mill, or a factory, or a printing office. It is in either case personally disgraceful to a man not to keep his contract." * * *

Deserters, of course, have not the appreciation necessary to the recognition of personal disgrace. Still should they be encouraged to commit crime, and thereby be placed en route to the military prison? On the contrary, they should be encouraged by the old cry of the people, when their sons and friends were on the eve of battle: "Warriors go; with prayers and blessings we your path will join."

Desertions were excessively numerous in the Revolutionary War, in the War of 1812, in the Mexican War, and in the late Civil War, all when the armies were composed, mainly, of irregular forces. Consequently the evil cannot be said to attach simply to the Regular Service, wherein more *discipline* is found. It must be remembered that with our vast increase of population the bad element has been greatly multiplied, and, consequently, its tendency to drift into the military service is far more extended than formerly. The enlisted force of the Service is far from a proportional increase. As a result, we find, for the year ending June 30, 1889, an increased percentage of desertion (not astounding when compared with that of other peace times*) standing forth most prominently, aside from some minor demoralization in other respects.

* The total number of desertions for the year ending June 30, 1889, was 2835, out of an enlisted legal strength of 85,000.

The mountain stream must not, as to purity, be condemned because it becomes polluted with mineral poison through feeders, often over golden sands, entering its course. The stream can be tapped above the feeders, and the pure water made to serve its healthful purpose. The volunteer armies of the late War must not be condemned because they were polluted by deserters and bounty jumpers. The pure current of healthful force found its level, and the pollution did not destroy the reputation of the armies; the uniform was considered a badge of great distinction. And the application of the principle, to our small Regular Army of to-day, will enable the current of its enlisted force to be directed so as to serve and strengthen every place wherein the honorably discharged soldier may fix his home.

We have reached the point, so long desired, when it is "practical for a soldier to terminate a *contract*, with which he has become dissatisfied, in a fair and honorable way," and to "make his punishment as sure as possible if he attempts to terminate it in a *dishonorable way*." The deserter-tramp class thus attended to, there will not be any difficulty as to the other portions of the enlisted force. It can readily be improved by the strong, healthful influences found at all posts, influences equally as intelligent and extensive as those found in civil communities of equal numbers; for it can be said, with truth, that to divide our 25,000 enlisted men into 50 communities of 500 each, or 100 communities of 250 each, and place them side by side with towns and villages embracing an equal population of males, moral superiority and sterling worth in every instance, would be found on the side of the enlisted man, who, as an essential part of the military establishment's foundation, has made it possible for civilization to advance over the broad domain of the American republic—the "child of experiment, irreproachable as a creation of pure reason," which has risen up "beyond the seas, to serve as a beacon to all future societies."

The recent act of June 16, 1890, in connection with other legislation, regulations and orders promulgated within the past recent months, are not for the benefit of the tramp-class, but, on the contrary, intended for the encouragement of intelligent, worthy young men. The entrance to the Army is to be carefully guarded, and the soldier, once in its honorable service, is to realize through experience gained in contact with honorable comrades, that he can, and will, "bear true faith and allegiance

The average enlisted strength of the Army for the years 1830, 1831, and 1832 was 6091; and for the years 1834, 1835, and 1836—6902.

In connection with the foregoing, the following is of instructive interest:

"The advance bounty allowed under the previous law was abolished by the Act of March 2, 1833. The number of desertions in 1830, 1831, and 1832, was four thousand one hundred and nineteen, (4119) being an average of one thousand three hundred and seventy-three (1373) during the last three years that the bounty of six dollars was paid in advance to each recruit.

The number of desertions in 1834, 1835, and 1836, was two thousand three hundred and four, (2304) being an average of seven hundred and sixty-eight (768), instead of one thousand three hundred and seventy-three (1373) or an annual reduction of six hundred and five (605) nearly one-half, during the first three years after withholding the bounty; and, in the aggregate, one thousand eight hundred and fifteen (1815) desertions less in the three years.

The number of infantry and artillery recruits enlisted in the first three years after abolishing the bounty exceeded the number enlisted during the last three years it was allowed, three hundred and ninety-three (393); while the number of desertions immediately after enlistment, or prior to joining companies, was two hundred and six (206) less.

This analysis has necessarily been restricted to the artillery and infantry; but, if the two regiments of dragoons be included (added to the peace establishment in 1833 and 1835), the number of desertions from the whole Army, in the three years ending December, 1836, will yet be one thousand four hundred and eighty-three (1483) less than the number which deserted from the artillery and infantry regiments during the three years ending December, 1832; while the enlistments, during the former period, exceeded the latter by one thousand four hundred and eight (1408)."

The enlistment loss in money, by desertion, in 1830 was \$102,087. (Doc. 305. H. R. 25th Cong.)

to the United States of America," and that he "will serve them honestly and faithfully." * * *

"Good character" is one of the pre-requisites for enlistment, but experience has indicated the difficulty of keeping bad characters from enlistment. As a result, poison has mingled with the pure stream, and the public, losing sight of the cause, is inclined to condemn the entire flow.

So positively is this the case, that the uniform of the enlisted men, instead of being viewed as the badge of worth and true manhood, is considered sufficient to bar the man from respectable recognition. The enlisted man, in civilian dress, can openly and freely associate with persons who, *when he is in uniform*, will pass around a corner to avoid him!

The remedy is in the hands of the civilian, and can be made effective by the civilian lending his influence to guard the entrance to the Army, and for the protection of the soldier's character, not only while he is in the Service, but particularly when he is honorably discharged from it. Then will that influence be of value to the Service, and not aspersive of it, as in the following extract:

GOING FOR A SOLDIER.

1. Can I enlist in the United States Army at Chicago? 2. To whom should I write for information as to the duties of a soldier?

WEST.

Van Buren County, Mich.

1. You can, but don't if you are good for anything else. 2. Write to the Superintendent of the Recruiting Service, United States Army, at Chicago, or elsewhere. Better still, ask some good old soldier."—*Semi-Weekly Tribune*, New York, Friday, September 12, 1890.

Don't (enlist in the United States Army) if you are good for anything else!

The foregoing language is that used in times of peace. It is not that of the people when the dark shadow of trouble is found in their midst, as during the riots of 1877, when, from all available points, small forces of Regulars were moved, with the utmost speed, to disturbed centres. Governors of States were then found begging the Department of War for a few Regulars, and to picture the acclaim received by the troops, as care-worn and travel-soiled, they entered great and prosperous cities, to afford protection to life and property, one may be pardoned for borrowing from a Latin orator:

"What shall I say of that day, when your city, after having so long desired and expected you, beheld you enter it? Neither age, sex, nor health could keep anybody from so unusual a sight. The children were eager to know you. The youth to point you out, the old to admire you; and even the sick, without regard to the orders of their physicians, crept out as if for the recovery of their health, to feed their eyes on you. Some said they had lived long enough, since they had seen you; and others that they only now began to live. The women rejoiced that they had children, when they saw for what prince they had brought forth citizens, for what general, soldiers. The roofs were all crowded and ready to break down under the numbers upon them; the very places where there was scarce room to stand and not upright, were full. The throng was so vast in the streets that it scarce left you way to pass through it, while the joy and acclamations of the people filled all places, and resounded universally to the heavens."

It is clear, in the light of recent reforms, that the Government will do all it can to eliminate the bad and to preserve the good elements. The people, it is believed, will come to realize the fact that an enlistment, *founded on a solemn oath*, is far above a contract made by an agreement to serve a specified time in a mill or a factory. And the way will thus be prepared by the acts of a generous Government, assisted by a well-inclined people, to give additional significance to an "honorable discharge" by making it so valuable that a soldier after five years' service—a veteran after ten—will find it an immediate passport, not only to a "Corps of Commissionaires," but to other honorable and remunerative positions.

The Corps of Commissionaires once established, it could be made a most valuable adjunct to the Army recruiting service, through the employment of its members, to select candidates for enlistment. Due to their military experience, the Commissionaires would be well qualified to investigate the character of the candidate for enlistment by ascertaining his associates and habits; whether married or single, and particularly to verify the statements made by him during his physical examination for enlistment. As requital for the services so rendered, the Government would economize by extending a liberal fee for each accepted recruit.

Briefly the Commissionaires would be practically members of recruiting parties; and, as residents in towns or localities, be situated so as to supply a great want, now recognized by all our recruiting officers.

The vast amounts now lost by the Government through desertion and discharges of men with unreliable character, would, in part, be saved by remunerating the Commissionaires.

An impetus, at an early date, can be given to the movement by the authorities connected with the coming international exhibition, to celebrate the four hundredth anniversary of the discovery of America, taking steps to employ the veterans who are taking their discharges from the Service under Section 4 of the Act of Congress, approved June 16, 1890.

The foregoing is, mainly, in connection with the Regular Service; but the corps could be further recruited, as well indicated by the article upon which these remarks are based.

The organization of the corps should receive energetic encouragement from the Grand Army of the Republic.

Colonel Richard I. Dodge, 11th U. S. Infantry.

The article in the September number of the Magazine entitled "Meritorious Discharged Soldiers," is interesting, but I am by no means satisfied that the system has such advantages as would command it to the Regular Army of the U. S.

Our people seem to have entered upon a wild struggle for money. Employés combine forces against employers, and these retaliate by forming enormous trusts. Politics has degenerated into a mere combine for the spoils. Organization and combination, so valuable in themselves, are made the means of wrong to every class of the community.

The Regular Army has so far kept itself aloof from this craze, and every true lover of the Service will do his utmost to keep it so.

I cannot believe that such an organization as that proposed can result in any pronounced benefit to the Service, or to the individual soldier, however meritorious.

Its effect on the Service would be to tempt many valuable soldiers to leave the ranks while they had yet capability for years of active work.

Its effect on the individual "meritorious discharged soldier" would be to put him into a machine in which his personal liberty would be ever less than when in the Service, and where his tenure of office would be implicit obedience to the behests of a committee who thus become masters, not only of his pocket but of his vote, and his whole personality.

To command the confidence of the community, such an organization as that proposed, must be conducted on the most rigid rules. The "meritorious soldier" while in service might get on a spree, or out at night, or absent when wanted for some duty with the result of a few days in the guard-house, or a small stoppage of pay. The same offence of the "meritorious discharged soldier" would result in dismissal, and an almost impossibility of obtaining employment elsewhere.

What with the pension laws, the Soldiers' Home, and retirement our "meritorious discharged soldiers" have little to complain of.

To my thinking such a system or organization as that proposed would result in more harm than good, not only to the Service, but to the "meritorious discharged soldier."

Colonel John Hamilton, U. S. A.

Scarcely any industry or way to support now starts up in our country till it speedily falls into the hands of organized capital. Journeymen have fallen into the hands of contractors, skilled mechanics are turned into operatives, etc.

When in New York in 1849, a professional messenger boy could not be found to run an errand. Some years later a few antiquated specimens used to hang about the corners round City Hall Square, with a red flannel band round the cap to show themselves ready for messenger duty. Soon after, with a spring, capitalized messenger companies were organized, and then it was farewell to individual industry in that line.

In our country, where Government leaves its common carrying to private companies, it is natural, just—and probably thus the public is best served—that the servants grow up in the service, passing through its grades by a kind of graduation, and thus the best are secured for their suited positions.

And so with other industries.

The governments of European nations have many places of reward for the retired defender of his country. They have the far-sighted policy to make such service an honorable one during its active continuance by assuring to it honorable recognition afterwards.

In accordance with our present system of army organization it will be a difficult task to say where a system of beneficency should commence. Excellent thinkers, practical field and garrison officers, statesmanlike in views, beyond the mere machine-like thought of their profession, believe that for the great majority of enlisted men, a service of three years is all that should be permitted. When a capacity for command, accounts, or instruction is developed, let such men be kept as the leaven for the new lump. No wrong is done the man of one-term service. Neither has he imposed any obligation on Government more than he would have done on a civil company for his employ for the same time, which is not provided for by pension laws. He returns to civil life carrying with him a good practical military knowledge of what should and what should not be exacted from the soldier; he returns improved in manners, in self-control, and in morals. Where one man's morals have been impaired by the Services, ten men's have been improved. Where in the Services you find the debauchee, the chances are ten to one that he brought his tastes in from civil life. The facilities to get rid of such men should be still increased, for as soon as military officers turn themselves into correctionary moral reform societies they are squandering the people's money; turn the rascals out, is the cheapest way, and let civil society manage its own dirt with cheaper and more effective machinery. This, an episode.

But, still, and yet, a large class of worthy soldiers and sailors, with considerable work still left in them, will be thrown by the exigencies of the Services upon the cold world, and to whom an organized helping-hand would be a godsend.

I feel great sympathy with Mr. Bloom's paper, and it has the advantage of being a word well said at the right time. It has apparently the grand advantage of practicability. When we see how many benefactions to the human race are now-a-day organizing, why should we despair of some enthusiastic humanitarian laying hold on and working up this philanthropy, giving it its first impulse.

Time certainly presses; avenues to individual support are filling up and closing

by organized monopolies, and organized bodies alone can contend for them. The most worthy old soldiers, men of established character, have failed to obtain positions they were eminently fitted to fill, because they never entered the corner rummery where the political slate of their district was made up. One case in the writer's knowledge, where the old sergeant was backed by comrades of the G. A. R. of the same post with the dispensing patron. He could not oppose the ward pull, and a young heeler got the place. Organization is needed to fight such influences.

It certainly would appear that an organization which could give reasonable guarantees of character to its protegés would become a popular resort for general employers. Something of the kind is to be found in cities where a Grand Army Headquarters is organized. These ameliorate the condition of many old war veterans and their widows and orphans by finding them employment.

A number of ways suggest themselves for its making the institution self-sustaining. One striking me, just now, that soldiers and sailors anticipating retirement or discharge should, monthly, for —— years pay into its treasury \$—, if they hope to ever advantage themselves of its services.

What other class of men shall be admitted to the benefits of the beneficence may safely be left to the future. One thing must be steered clear of, viz., separate military organizations—they would at once become antagonistic.

The whole should not be a matter outside the serious consideration of the active officer, for, beyond the question of sympathy due to a common service or a common peril, some security of employment after his service gives the present active man a greater dignity, and is a kedge anchor to character.

Colonel Edward P. Vollum, Surgeon, U. S. A.

I saw a good deal of "The Corps of Commissionaires" Mr. Bloom mentions in his article during my rambles about London in my several visits there, and I was always impressed with the appearance of reliability, self-respect and soldierly bearing. They fill a place in the great city that no common every-day men could, for every one knows that they have had an honorable career in the public service, and have the stamp and endorsement of official approval, which justifies their employment without a moment's inquiry as to their fitness upon services of a confidential nature, such as custodians of offices, door-keepers, and as messengers intrusted with money, letters, and parcels, etc. Their respectable personal appearance and attractive uniforms, give a certain tone to the hotels and other places where they are employed. The service they render is of a kind that belongs to mature, trustworthy men, rather than to messenger boys, as will appear upon a little reflection. I believe with Mr. Bloom, that there is an opening in this country for a corps similar to "The Corps of Commissionaires" in London. I am sure that honorably discharged men from the Army, Navy, Marine Corps, veterans of both the Union and Confederate services, would find employment in such a corps, where they could make a respectable living in the performance of a peculiar class of services, that only such men would be intrusted with. There is a place in this country for such a corps, and plenty of good men to belong to it.

Captain James Chester, 3d U. S. Artillery.

The organization of honorably discharged soldiers for mutual help, on the lines of the London Commissionaires advocated by Mr. Bloom in the September number of the JOURNAL, is a fresh field for some enterprising philanthropist, but it is doubtful if it can be cultivated to advantage so far as ex-soldiers of the Regular Army are concerned.

The old soldier element in civil life, even when the term is restricted to honorably

discharged soldiers of the Regular Army, must be considerable, and it might seem strange to a casual observer, that no organization like that advocated by Mr. Bloom, has ever been attempted in this country ; but when one comes to consider the status and privileges of honorably discharged soldiers it seems less surprising.

The ex-soldiers of the Regular Army who left it honorably and are now in civil life, may be classified under the following heads : 1st. Retired enlisted men. 2d. Soldiers discharged after twenty years' service. 3d. Soldiers discharged for disability. And 4th. Soldiers discharged at the end of their first term of enlistment.

The first class being amply provided for by their retired pay, need not be considered. They are as a rule excellent men, and the majority of them, perhaps, have been retired as non-commissioned officers. They need no help and are sure to find friends wherever they go.

The second class consists of men who have soldiered too long to feel comfortable in civil life in any position. The barrack-room has been their only home for so many years, that a few months' experience in civil life arouses in them a desire to return to it, and as a rule, they find their way to the Soldiers' Home. They have been accustomed to guidance and government, and have had some one to do the thinking for them for so many years, that the so-called liberty of civil life has no charm for them. It is doubtful if this class would appreciate the benefit which might be derived from the proposed organization.

The third class consists of two sections. The first section is composed of men discharged for disability contracted in the line of duty, and the second of men discharged for disability not so contracted. The first section is entitled to pension, which, however, may be such a miserable pittance, that it must be supplemented in some way or the pensioner cannot exist in civil life. Men of this class would undoubtedly be benefited by the proposed organization. Still even this class need not fear absolute destitution. The Soldiers' Home always stands between them and the poor-house. Men of the second section are to be pitied. They are thrown on the world in a disabled condition and cannot claim any of the benefits and privileges accorded to the first section. Still army service is in no way responsible for their condition. They are men who would have fallen by the way side, even if they had never worn uniforms, and although they are objects of charity, they are not so because of their military service.

The fourth, and perhaps the largest class, may also be divided into two sections. The first is composed of young men whom love of adventure, difficulties with friends, or temporary congestion of the labor market has driven into the Army. They serve honestly and faithfully during their five years, but they never lose touch with their home relations. When their time expires they return to their friends, and are reabsorbed into civil life, and after a few years almost forget that they have ever been in the Army. The second section of this class is composed of what may be called the tramp element. They have never stayed long in any one place. Necessity, perhaps, drives them into the Army, but they never feel at home in it. The restraints of discipline are irksome to them. They take no satisfaction in the Service, and give none. At the end of their term, they and their captain part with mutual satisfaction, and they carry their discharge into civil life as a kind of capital, the interest upon which should maintain them in some easy situation all the rest of their lives. These are the men who would be most prominent in any organization for the benefit of honorably discharged soldiers. Such an organization would furnish them with the needed base of operations. Its uniform would emphasize their declamations upon the immensity of the debt which an ungrateful nation owed them for their services in the Army. Upon the whole, we doubt the necessity for such an organization in this country.

Major James Jackson, 2d U. S. Cavalry.

What becomes of the discharged men is often a matter of serious thought to company commanders, with whom these men have served for years, and to whom they have become attached in the varying circumstances of duty and responsibility under which they have been thrown together. A commander never loses a good man without wishing him a prosperous future, and is always pleased to hear of his well-doing. Many of these men, measurably through the discipline received in the Service, have become prominent citizens and are now occupying places of honor and profit, or, have settled down to business pursuits and are prospering beyond the need of any assistance, but there are many who, not desiring to spend a whole life in the Army, go out to become the buffet of fortune, are forced by dire necessity to forego making homes for themselves and either drift back into the Army for life or take to evil courses. To such men, valuable citizens from their military training, an association similar to the "Corps of Commissionaires" described by Colonel Bloom would be an efficient help and to the business community a boon. Owing to the paucity of our Regular force such an association could not have the same extent of usefulness in this country as in England, but by including the National Guard its organization might be worth attempting in some of the large cities. It would help to draw together and keep together a trained and conservative element upon which the Government could depend in emergencies.

The "veterans" are passing away—notwithstanding the length of the "pension roll"—and the Nation will need in the future, to keep track of, organize and utilize all those who have received a military training in its Regular Army, Navy, or National Guard. To enroll these men in a corps and assist them to honorable and useful employment under conditions similar to those described would be a worthy labor, helpful to the men, valuable to the country.

Captain Edward Walter, Corps of Commissionaires.

I am much obliged for the September copy of the *JOURNAL OF THE MILITARY SERVICE INSTITUTION*, and have read your account* of this corps with much interest. There are naturally some inaccuracies, but none of vital importance, as regards the objects or management of the institution; and I can only say that if the officers of the Army and Navy of the United States and their friends should at any time think of starting a corps of their own on similar lines to that established here I shall be happy to assist them in doing so, provided they will credit a retired officer and a non-commissioned officer to me for a month or so in order to get a practical acquaintance with the principles and details of our work. Nothing else than this, I am convinced, would be of use. * * * There are two points on which you would do well to follow our example here. Firstly, to have nothing to do with Government or the numerous class of philanthropists and society patriots. Secondly, to abstain from taking subscriptions or other aid except from those who are in the position of gentlemen, and are perfectly free from all professional politics. You will require pecuniary assistance only for the salaries of the officers, consequently this should not be in any way derived from the men or from those who are not in the same social position as the officers themselves.

Our members have nothing directly or indirectly to do with the management of the Corps; I have vested this exclusively in the hands of the officers of the Army and Navy. The men pay such taxes as are necessary to defray their own expenses, and have simply to do this and obey the rules they have signed in order to get certain

* This is an extract from a letter to Mr. Bloom.

employment, and twenty per cent. better wages than they could procure for themselves.

Will you give my compliments to those gentlemen who have written to me on the subject of your article, and say that if any officer comes over here I shall be happy to see him. In the accompanying copy of our annual circular, page 7, you will observe that with the exception of the Dowager Marchioness of Westminster, three-quarters of the officers' endowment fund has been derived from the officers of the Regular forces. They are consequently not only the most competent but most natural trustees of the future interests of the men they have trained.

BARRACKS OF THE CORPS OF COMMISSIONAIRES,
London, Eng., Oct. 1, 1890.

II.

"The Place of the Medical Department in the Army."

Bvt. Major John Brooke, Surgeon, U. S. A.

In his criticism on Woodhull's "Place of the Medical Department in the Army," Captain Chester makes the following statements:

"Medical Officers were not members of the hierarchy of command, and were therefore ineligible to sit as members of courts-martial * * * Indeed it was the recognized and ruling custom of the Service as late as 1865." * * *

"But the War being over and the harvest of brevets gathered, * * * Medical Officers were therefore placed upon the roster and detailed as members of courts-martial by virtue of their brevet rank."

Further on—"they had gotten upon the roster under cover of their brevet commissions. The eye has become accustomed to their presence."

Now the "harvest of brevets" was not gathered until 1865, and my own crop did not mature until midsummer of that year: yet in 1863 and 1864 I did a great deal of duty as member of courts-martial, garrison and general; much more in fact than I have done during a like period since. Judging from the Captain's standpoint "the General or other officers set over him" must have had the sensibility of their visual organs prematurely blunted; and they erred grossly in assigning a Medical Officer as member of a court-martial before he had been admitted by brevet commission into the "hierarchy of command."

For one I have no desire to sit on courts-martial; and I think it would be better if Medical Officers were not subject to such details in any capacity. But to say that we are not *eligible* for such duty is entirely a different matter.

Army surgeons are *officers*, appointed, confirmed, and commissioned by the same powers as are other officers of the Army. They are the peers of such other officers in intelligence, education, and culture; and they know equally well the inner life, the motives and temptations, of the men of the Service.

The legal authority for courts-martial, the Articles of War, simply requires that they shall be composed of *officers*. There is no restriction as to Arm, Corps, or Department. There is no limitation of the general rights and privileges of Medical Officers except the one—that they shall not exercise command beyond their own department. The question—"is it right" that they should sit in judgment? making the point solely on this restriction of their power to command, naturally recalls the times when the only passport to the "hierarchy of command" was the privilege of carrying a sword, or the right to wear a pair of spurs. Attila might have sat on courts-martial; Hippocrates could never have been eligible.

FORT MONROE, VA., Sept. 14, 1890.

Captain C. N. B. Macauley, Medical Dep't., U. S. Army.

In the JOURNAL OF THE MILITARY SERVICE INSTITUTION for September, 1890, Captain James Chester, 3d Artillery, condemns Lieutenant-Colonel Woodhull's reasons for giving military medical officers their military titles.

Captain Chester says (p. 823): "We hardly think Colonel Woodhull succeeds in establishing his case." In all friendliness, I do not think Captain Chester has established his either, for, like most of his brethren who have never given this subject much thought, he sees the traditional side of the shield only. Let me turn it so that he can see the other side.

Par. 2 (p. 823). The title of "assistant-surgeon:" Captain Chester asks wherein this title is less descriptive than that of 1st lieutenant.

In this: 1st. The name "lieutenant" means, literally "place holding,"—liberally—"one holding the place of" (a senior, in his absence). It does not mean "assistant."

That the "1st lieutenant in the military service is and always has been the captain's assistant" may be one meaning of it, but he is never called so.

2d. The title is not even "descriptive of his office." With the exception of his first few months' service the lieutenant of the Medical Corps, in nine-tenths of the cases, is nobody's assistant. My personal experience is that of the whole corps, with possibly here and there an exception. Less than sixteen months of my service has been as an "assistant," the rest of the time I was alone, and therefore, no one's assistant. Practically this is the record of nine-tenths of the so-called "assistant" surgeons. The name is by no means "descriptive of the functions of his office."

3d. It appears to me that it is about on the same footing as applying the name "Cavalry," "Infantry" or "Artillery," as a title to the officers of those arms, and no more.

4th. As a title of address—in speaking to a medical officer—it is clumsy, and is never used.

5th. An assistant surgeon may be either a captain or a lieutenant.—the title fails to describe him in that way. We ask the same particularity as to our rank that the line does.

6th. Colonel Woodhull does not "borrow" what is given by law to all staff officers. I would refer Captain Chester to the Statute. It says: "shall have the rank," etc. Without making a Shylock of myself, I think it is "so nominated in the bond."

Par. 3 (pp. 833-824). Captain Chester admits that the rank of 1st lieutenant "is legal and indisputable," but declares that its character "is tainted by the statute which deprives it of the full functions of command." Paragraph 18, A. R., 1889, (also par. 17, A. R., 1881), say that pay and medical officers "cannot exercise command, but by virtue of their commissions they may command all enlisted men like other commissioned officers."

The medical officer, like his brethren of the Engineers and Ordnance, has enlisted men attached to his department over whom he exercises the same authority as the commanding officer of any troop, battery, or company does over his men. (This by an Act of Congress, 1887, passed since the statute from which the paragraphs of the Regulations are taken, was enacted.)

It looks to me as though this is properly a "function of command." Furthermore, if the medical officer's is a "kind of latent rank, and does not confer on him place or title in the hierarchy of command," what is he doing with a detachment of enlisted men for whose military care and discipline he is responsible? Again, why are paymasters addressed by their military titles when they are in the same category as

medical officers? In fact, why address any staff officer by a military title? Par. 18, A. R., 1881, limits them too. They can only exercise command at the express command of the President. I do not want to drag in too much of my personal experiences, but as an illustration that we have the functions of rank and command, I mention this: Soon after the formation of the Hospital Corps, I received a packet of "Soldier's Handbooks" from the Adjutant-General's office addressed to me as: "Commanding Officer, Detachment Hospital Corps, Fort Gibson, I. T."

I fancy I am not the only medical officer who received those packets similarly addressed.

Par. 4 (p. 824). The lieutenant of the Medical Corps receives no new commission on gaining his step after five years' service, but the law which gives him that step says he "shall have the rank," etc. of a captain of cavalry. We do not claim that it made us captains of cavalry, or captains of anything but our own corps. Had I desired to be a captain of cavalry, I should have gone to the cavalry originally, instead of standing my examination for the Medical Corps.—I had my choice. The law made me a captain of a staff corps, and as such I always have deemed the title mine.

Par. 5 (p. 824). The argument of a lieutenant calling himself "Colonel" because he happens to command a regiment, has no application in this discussion, the lines are not parallel. Colonel Woodhull said nothing in his article that could lead one to suppose that we wish to call ourselves by any but our actual grade,—unless a brevet has been granted.

I cannot confess to having had any desire to sign myself "captain and assistant-surgeon" because while a lieutenant, (and post surgeon of a one company post in Dakota) I was ordered for temporary duty in charge of a post that had head-quarters, band and four companies in garrison, during the absence on leave of the post surgeon (a captain). Nor more recently, did I feel any desire to sign the morning report of the hospital "Major and Surgeon" because the post surgeon was away on detached service.

The last lines in this paragraph say, in effect, that the President confers the title in the commission, and that it is the only title the officer can claim, whether it is descriptive or not. The medical officer's commission does not differ from that of the other staff officers, except in the name of his corps. Why, then, call staff quartermasters and the others by their military titles (which are granted by law in the same way as ours) when they have just as "descriptive" ones as the "assistant" surgeons.

Par. 6 (p. 824). I do not think, with Captain Chester, that "the question is settled by the commission," he must bring "reasons why" that hold together a little better than the ones he gives. Why spring an exception in the name of the rule on one staff corps, and say that "that settles it"? No one thinks of calling quartermasters, commissaries, and the others by their staff titles, why make exceptions?

Pars. 7 and 8 (p. 824). Colonel Woodhull's "plaint" (?) that the title of "Doctor," in military society, means nothing is true in the light of "position (grade) in a military community," like an army. The veterinary surgeon is called "Doctor." I have heard a troop farrier called "Doctor" by the men of the troop. Colonel Woodhull, as well as I, has seen men in the ranks whose right to the degree of Doctor of Medicine was as indisputable as his. I know of one who had the degree of D. D. S., who was known to the men in the company as "Doctor." I have heard the men detailed in the hospital as attendants, and later on, the men of the Hospital Corps spoken to as "Doctor," and also by the very objectionable one of "Doc." It was done in fun by the others.

If the men ever hail each other as "Cap" or "Loot'nint," or even the unabridged names, I have never heard of it. As Colonel Woodhull says, in a military community

the military title is the only one handled with respect,—and a civil one is out of place. In civil life this makes no difference, but in military life it does.

Medical officers are the only staff officers continually with troops. Many of the others never see a Regular soldier,—some, as Captain Chester knows, have never seen one, and wouldn't recognize him if they did,—are given their military titles without question.

Undoubtedly the title "Doctor" is the highest degree of the learned professions, but it is a civilian title, and those same learned professions have their ranks or grades, but with civilian names. (L.L.B., L.L.D.: B.S., M.B.—M.D., etc.)

In civil life these are well enough, they show a rank, but they show nothing in military society. Medical officers have duties which they would not have outside of the Army.

Pars. 9 and 10(p. 825). How many officers who have seen no war service, (civilized or savage) look at "non-combatant" in the light that Captain Chester sees it? To the unthinking "non-combatant," as Colonel Woodhull says, means: "One who is mysteriously protected from all risk," or "whose duty is always discharged at the rear and in complete safety." A large majority would give these latter definitions, rather than the former. This is not mere statement, I have heard it defined several times.

Medical officers do not ask their military titles as a certificate of bravery, it is asked on the same ground that other officers desire theirs,—to show where they stand in the different grades of the "military hierarchy."

Pars. 11 and 12. There are no books at hand to which I can refer on the point raised in this paragraph, as to what was the cause of the controversy over the eligibility of surgeons, chaplains, and paymasters to sit as members of courts-martial. I think, and I believe I am right, that an Act of 1866 (?) reorganizing the Medical Department, placed medical officers on the same footing as other commissioned officers.

The customs of Service have changed,—those *ante bellum* to the contrary notwithstanding. The comparatively recent Act creating the Hospital Corps (1887), has removed the "taint" from the medical officer's commission, and has made him a member of the "hierarchy of command." Par. 13 (p. 826), is the first statement I have seen that laid the sitting as members of courts-martial, to the brevet commissions held by medical officers.

Par. 14. Dragging the chaplains into the argument seems to me to be begging the question a little,—they are not in the same category. However, as it is done, an answer is ready to the statement that "Chaplains do not appear to have been admitted to the roster." The chaplain at this post, Fort Supply, I. T., has only recently returned from another post where he was ordered, with two line officers, as a member of a general court-martial; he was, later, judge-advocate of a garrison court here, and is, at the present time (September) president of another.

Par. 15. With regard to its being distasteful to line officers that the medical officers should be known by their military titles. It is not invariably so because I know many who willingly give these titles when it is so desired. I heard a general officer, a soldier through and through, say he intended in future to use the military titles when he knew the officer had no objection. That there are medical officers who do not want it, I must admit, but I am pretty sure they are in the minority. I know some others, however, among the seniors, who in talking the matter over, admitted they thought the military title the proper one, and they are men who have the reputation generally of preferring the civilian title.

Par. 16. Captain Chester's shout of delight when he tumbles on Colonel Woodhull's remark that "The President can make no man a colonel in the Medical Depart-

ment," is almost audible. I do not think that is exactly the idea intended. After hearing the paper read, I spoke to Colonel Woodhull about it. There is an old Army saw that says: "The President can make any man a colonel, but he can make no man a "doctor" (physician?). This, if I remember my conversation correctly, was what was intended, for when I said the "President made more physicians in one year than colonels in ten years," by reason of his being *ex-officio*, president of one of the District of Columbia Medical Colleges, Colonel Woodhull said he did not know of it before. The President, as president of the college, has to sign the diplomas of the graduating class, just as the presidents of other colleges do. The diplomas are worthless without the signature.

What, may I ask, does the President do when he promotes a lieutenant-colonel (surgeon) in the Medical Corps to a colonelcy (also surgeon)? Does he merely promote from surgeon to surgeon, or does he promote to be "surgeon with the rank of colonel"? If that is not making a colonel in the Medical Department, it comes very close to it.

* * * * *

I have heard line officers on the plains say that they thought it was singular that the medical officers, who always served with them, "and who are of us as well as with us" should be the only ones whom it is insisted should not be known by their military titles.

This paper has long overgrown its limit, but I would like to overhaul one or two of Captain Cotton's remarks. His memory failed him when he forgot the instances he, as well as almost every other officer, must know of, wherein a commanding officer has solaced "himself with that panacea to others—an order." Illustrations are not needed.

"There is no corps where undue stress laid on the question of rank by its officers, can work such detriment, if not cruelty to those around them, as the Medical Corps." How? Why the medical officers, who, as a body stand less on their rank than any others should have such dark and dreadful insinuations cast upon them, I do not understand. Has Captain Cotton ever known of a medical officer coming into a post and turning the household effects of a junior (who was out in the field) into a tent on the parade? Just that was done by a line officer. Did he ever hear of a medical officer arriving at a post and giving a junior three days to move out, and this junior was married? This was done by a staff officer, within my knowledge.

What other "detriment" or "cruelty" a medical officer can inflict by laying the same stress on his rank that his brother of the line does, is not plain to me.

That any atrocities have been committed by the corps, I have never heard, nor do I think, has Captain Cotton. This is really the first time that I have suspected that line officers have had to stand around with muzzles and straight-jackets in their hands ready to corral and suppress this terrible fellow, the military medical officer, at the first symptom he may show of a disposition to run a-muck. I really had no idea that we were such a terrible lot, or that we revelled unduly in "detriment" or "cruelty to those around us." No doubt Captains Chester and Cotton will think that I am one of these to whom "cruelty" and "detriment" are a delight. I am not, however.

Finally, has it occurred to Captain Cotton that, except the Engineers and Ordnance, the Medical Corps is the only one that has any examination at all for promotion? Has he ever heard medical officers sit down and growl, like a bear with a sore head, at that examination? I have seen officers of other branches wax exceeding wroth over the mere threat of instituting an examination for promotion. We have none on the promotion to captain, but we have for the next grade.

"Heaven help those of us on the plains" if it was not for that examination. No

one recognizes its value more keenly than the detriment working "military" medical officer. "Those of us on the plains do not seem to complain, or call on heaven for help because "the Doctor" takes pride enough in himself and the Service to be "military," whatever "those of us" on the sea-coast may have done.

I have never yet known or heard of one of my corps who allowed his "militarism" to interfere with his duty to his patients, and I have known some who were very "military."

The most "military" medical officer in the Service (whom I have the pleasure of knowing personally), has nearly worn himself out in the care of his patients, but he is very soldierly in his ways, and his hospital would serve as a model in its appearance and working, for any hospital in the world,—it is a model for the Army.

This officer will neglect his comfort,—even his health—for the least sick of his patients. The "detriment" and "cruelty" seem to be on the other side.

Captain Cotton merely glanced at the 'ge of the shield.

FORT SUPPLY, I. T., September, 1890.

Captain James Chester, Third U. S. Artillery.

Assistant-Surgeon Macauley of the Medical Department, strikes rather widely, we think, at our remarks on Colonel Woodhull's paper, published in the September number of the JOURNAL. We do not propose to follow him outside the issue, and have nothing to add to, or alter in, our original remarks. Still he makes a few statements which can be answered without transgressing that rule.

His explanation of the meaning of the word "Lieutenant" is gratefully acknowledged, but not accepted. We prefer the military meaning given in Worcester, namely, "An officer next in rank below a captain. The second commissioned officer of a company." When we decline in our remarks "to appeal to philology for the origin, history and meaning of any of the titles," we did not mean to confess total ignorance on the subject. But we are much obliged to our critic all the same.

The assertion in the fifth paragraph that "an assistant-surgeon may be a captain or a lieutenant" simply begs the question. Our contention is that he cannot be either.

The reference to our "Brethren of the Engineers and Ordnance" is altogether gratuitous. There is no taint in their commissions. They have an acknowledged place in the hierarchy of command. See par. 16 A. R.

We are glad to be informed that Assistant-Surgeon Macauley had the option of entering the cavalry arm, but we fail to see what that fact has to do with the question at issue. Nor can we understand how the custom of addressing certain staff-officers by the military titles under which they are assignable to command, can be considered an argument in favor of according such titles to staff-officers who are not so assignable.

Like Colonel Woodhull, our critic seems to insist that the words "in the rear" and "in complete safety" have a legitimate place in the definition of "non-combatant." We begin to fear that we must have drawn the lines too tightly in our definition, and therefore turn to the dictionary. Worcester defines the word thus, "A person associated with an army or navy, who is not required to fight." Upon the whole we think our original definition was about right.

Towards the close of the criticism we come upon a refreshing reason why medical officers desire the military title, namely, "To show where they stand in the different

grades of the military hierarchy." Why the contention is "That they have neither place nor title in the hierarchy."

We are asked "What does the President do when he promotes a lieutenant-colonel (surgeon) in the medical corps to a colonelcy (also surgeon)? We answer: The Lord only knows. In the first place there is no such organization in the Army as the Medical Corps, and in the second place there are no such titles as colonel and lieutenant-colonel. We give it up.

Captain W. D. Dietz, Asst. Surgeon, U. S. A.

Kindly allow undersigned to proffer a few remarks concerning recent letters published in the JOURNAL, apropos of Colonel Woodhull's article on "The Place of the Medical Department."

The authors of these communications are Captains Chester and Cotton of the Artillery. Captain Chester's article inclines to the argumentative; Captain Cotton's is rather rhetorical, and characterized by a tendency to deprive the meaning of certain quotations from Colonel Woodhull of its contextual limitations.

Captain Chester in his opening paragraph falls into the error of confounding two things spoken of in Colonel Woodhull's paper,—the military title and the descriptive title. Colonel Woodhull prefers the descriptive title *medical officer* to *surgeon* or *assistant surgeon*, and the military titles,—*colonel, major, lieutenant*, as the case may be, to the civilian title *doctor*.

Again, Captain Chester objects to the application of the title *lieutenant* to an *assistant surgeon*, because a "a lieutenant in the military service is and always has been, the assistant of the captain." If this be correct, *lieutenant* is not the proper title for a regimental adjutant or quartermaster.

The rank of a medical officer, according to Captain Chester, is given merely to protect his dignity and pocket. That such rank is given to protect the dignity of the medical officer is in the line of Colonel Woodhull's argument, that it was not so conferred to protect the officer's pocket is evident from the wording of the statute. For instance, in the case of surgeons of the rank of major, the Revised Statutes read:

"The Medical Department of the Army shall hereafter consist of * * * fifty surgeons with the rank, pay, and emoluments of majors." In the foregoing, the words *pay* and *emoluments* amply protect the pocket; the word *rank* is needless for such purpose.

Captain Chester argues that the limitations as to command obtaining in the case of a medical officer operate by tainting his rank, to vitiate his right to the title of that rank. Why this should hold in the case of medical officers, when other staff officers, subject to similar limitations are accorded military titles he does not explain.

"The question of title then," says Captain Chester, "is settled by the commission." In making the assertion, however, he has confounded the descriptive title with the appellative. An unchallenged custom of the Service has long since established the propriety of the military appellative for certain staff officers,—commissaries and quartermasters, for instance,—and there would seem to be no valid reason to deny it to the medical staff whose military rank is "nominated in the bond," the Revised Statutes.

Captain Chester states that "the plaint of Colonel Woodhull that the title of 'doctor,' by which medical officers are almost universally addressed in military society 'means nothing' is a somewhat startling statement." He has, however, misread Colonel Woodhull's words, which are to the effect that "doctor, in itself means nothing." Viewed in the light of this emendation, and with due consideration of con-

text, the statement will lose many of the startling qualities of its incorrectly quoted form. The parallel drawn by Captain Chester when speaking of the titles "doctor" and "colonel" is hardly a legitimate one. "Colonel" not being subject to the objectionable range of meaning attached to the designation "doctor," even legitimately borne.

On the question of the eligibility of medical officers to sit on courts-martial little need be said. Attention is respectfully invited to Article 75th, which establishes it, *ante-bellum* authority to the contrary notwithstanding. Captain Chester's theory as to how this eligibility came to be established is ingenious but not pertinent, neither is the statement that a seat at the table did not save the man who was without a wedding garment.

ALCATRAZ ISLAND, CALIFORNIA, September 18, 1890.

Reviews and Exchanges.

The Personal Memoirs and Military History of U. S. Grant versus the Record of the Army of the Potomac.*

WITHOUT adopting all the conclusions of this book, still less its remoter inferences, it may be safely said that it is well worth reading. More than that, it is doubtful if the seeker after truth will not be largely profited by the perusal.

The most famous men have their limits, and it is astonishing how soon in some directions they are encountered. Madam De Stael said of Wellington that for so great a man he was made of very small material. There appears to have been a good many chips mixed with the larger blocks of his composition.

If our Great Rebellion terminated at Appomattox, it is certain that the road led by no Marengo, perhaps, because there was no Melas in the problem, though something like the Aulic Council certainly did exist upon one side of the Potomac.

Woman is seldom considerate of her rivals in beauty, and the soldier is often more tolerant of his opponent than of his competitor. If Marlborough and Eugene worked in complete harmony—there is evidence that the harmony had its weak spots—the one looked more to London and the other more to Vienna.

Renown is not so very alarming when it hides itself in a foreign language and has to be spelled out by a dictionary.

Perhaps it is not reasonable to expect any just comprehension of the Greek by the Viking. It is the old antithesis of Art and Force, the man with the axe and the man with the theodolite.

One is careless of obstacles, impatient of opposition, suspicious of delay. The other values method, eliminates accidents and waits opportunity. One marches and the other manoeuvres. To the one talk about dispositions and diagrams becomes cant, and to the other muscle and speed seem vulgar. One says, "Let us consider, and the other, "Go ahead."

Both types of men have done a good deal of the world's work, are brought out in every emergency, have been sketched in the *Talisman* with the story of Richard and the steel mace, Saladin and the silken scarf, and both appear in the volume under review.

It takes a long time for a man to recognize his mistakes and longer yet to remedy them. History is a continuous process of readjustment as Thirlwall displaces Mitford and Grote, Thirlwall and Curtius, Grote.

Mistakes then as well as merits are a fair subject of investigation, and there would seem to be little need of delicate scruples in the criticism of the acts and motives of a general who could write of George H. Thomas, "He never can make a campaign there or elsewhere," meaning towards Lynchburg after Nashville.

* *The Personal Memoirs and Military History of U. S. Grant versus the Record of the Army of the Potomac.* By Carswell McClellan. Houghton, Mifflin & Co.

But it must be admitted that Grant made something more than a day's excursion to the south side of the Rapidan. He took the Army to Richmond and through it. The job that had been waiting for four years was done at last, and the problem as to whether it might not have been done better is fortunately all that is left to us to discuss.

To that discussion this book is an important contribution.

Speaking, however, for ourselves only, we improve the opportunity to remark that while it is pleasant enough to take a peep into the realm of "Wonderland" we do not care to dwell there.

And as for riding "Behind the Looking-glass," booted and spurred, even with Jomini, it is well enough to remember that in this kingdom of "Might, Could, Would or Should Be," knights, whether white or red, have great difficulty in keeping their seats, and if they can always invent a new pudding it rarely gets cooked, which is just the critical point of the business.

And this is particularly difficult when the materials are "blotting paper and gunpowder," so seldom judiciously used.

The experience of Miss Alice contains many a wholesome moral for the military pen. "The great art of riding," said the Knight, "is to keep your balance properly, like this, you know,"—and the Knight let go the bridle, stretched out both arms to show what he meant—and fell flat on his back right under the horse's feet.

H. W. C.

The Influence of Sea-Power Upon History.—1660-1783.*

The subject of this important contribution to historical literature is broad and comprehensive, and Captain Mahan has brought to his self-imposed task an intelligence and zeal worthy of so great a theme.

The book seems to be in some sort one of the outcomes—and a very good one it is—of that revival of the study of naval history which took its rise in England only a year or two ago. Indeed, some expressions in the singularly lucid and instructive introduction would seem to shadow forth that the conception of the work directly followed certain discussions which took place at the Royal United Service Institution in 1887-89.

Whether discussing the diplomatic events preceding active naval operations, whether describing the elaborate plans auxiliary to or independent of operations on land, or narrating the details of the strategic movements of naval commanders, there seems to pervade the entire work a conscientious impartiality which can alone make a history of any value.

At a time when the historical method is, one might say, but struggling to the front, it was a bold idea to use it in challenging all the historians in a body with neglect of the primary element in the changes of political geography.

Perhaps a broader scope of this most interesting discussion might be embraced under the title "The Influence of Sea-Power upon Civilization." For it is not history alone, but the progress and development of human energies and human thought that have been affected by the evolution of naval power. The development of a people's power on the sea is coincident with the development of its civilization.

How well the story of these great ocean battles has been told by Captain Mahan, how carefully the details of the famous naval engagements that decided the supremacy of the sea for this or that nation has been related; how well the plans explained and

* *The Influence of Sea-Power upon History, 1660-1783.* By Captain A. T. Mahan, United States Navy. Boston: Little, Brown & Co., 1890.

the intricate manœuvres described can only be appreciated by a perusal of this unique contribution to naval science.

It is, according to our author, sea-power, its distribution, and the use which has been made of it, that has had most to do with the positions in which modern nations find themselves, yet the nations have by no means generally realized the fact; and some of them, such as France, have had it in their power to make a choice, and have made a wrong one. It might be stretching the point much further than Captain Mahan would stretch it, yet the thought will intrude as to what might have happened in the late Franco-German War, had France, by the use of her preponderating navy, transferred the main theatre of the war to the German Baltic provinces, and restricted her home operations to a purely defensive attitude along the line of her frontier fortresses. If France had been prepared it would have been an easy thing to do, and it would have remained to be seen whether a German invasion of France and the defense of her northern provinces could have been carried on together.

To exemplify the author's views on the study of tactical naval history, we may take the following :

We may therefore accept now the words of a French tactician, who wrote a century and a quarter ago : "Naval tactics are based upon conditions, the chief causes of which, namely, the arms, may change, which in turn causes necessarily a change in the construction of ships, in the manner of handling them, and so finally in the distribution and handling of fleets." His further statement, "that it is not a science founded upon principles absolutely invariable," is more open to criticism. It would be more correct to say that the application of its principles varies as the weapons change. The application of the principles doubtless varies also in strategy from time to time, but the variation is far less; and hence the recognition of the underlying principles is far easier. This statement is of sufficient importance to our subject to receive some illustrations, from historical events.

The battle of the Nile, in 1798, was not only an overwhelming victory for the English over the French fleet, but had also the decisive effect of destroying the communications between France and Napoleon's army in Egypt. In the battle itself the English admiral, Nelson, gave a most brilliant example of grand tactics, if that be, as has been defined, "the art of making good combinations preliminary to battles, as well as during their progress." The particular tactical combination depended upon a condition now passed away, which was the inability of the lee ships of a fleet at anchor to come to the help of the weather ones before the latter were destroyed; but the principles which underlay the combination, namely to choose that part of the enemy's order which can least easily be helped, and to attack it with superior forces, has not passed away. The action of Admiral Jervis at Cape St. Vincent, when with fifteen ships he won a victory over twenty-seven, was dictated by the same principle, though in this case the enemy was not at anchor, but under way. Yet men's minds are so constituted that they seem more impressed with the transiency of the conditions than by the undying principles which coped with them. In the strategic effect of Nelson's victory upon the course of the war, on the contrary, the principle involved is not only more easily recognized, but it is at once seen to be applicable to our own day. The issue of the enterprise in Egypt depended upon keeping open the communications with France. The victory of the Nile destroyed the naval force, by which alone the communications could be assured and determined the final failure; and it is at once seen, not only that the blow was struck in accordance with the principle of striking at the enemy's line of communication, but also that the same principle is valid now, and would be equally so in the days of the galley as of the sailing ship or steamer.

The various theses which underlie these quotations are worked out in the book with a force and clearness which leave little to be desired. The period of history chosen for illustrating the argument begins with the first Anglo-Dutch war and ends with the close of the war of American Independence. The period is not ill-chosen, and the treatment of the history is generally admirable. The author shows over and over again the enormous effect of properly understood naval strategy, properly carried out. He hardly hesitates to assert that if the French had properly understood the naval problem, William III. could never have fought the battle of the Boyne, and the Whigs would have gone under upon the return of James to his throne. He does not hesitate at all to point out that it was the naval alliance of France and Spain against England, and

not the prowess and determination of the revolted Colonists alone, however great that might have been, which broke the Colonial tie and created the United States. It was indeed declared at the close of the war, that English naval shrinkage by comparison, compelled a peace. The author is particularly happy in showing how the neglect of the French Government to cut the communications between England and Ireland in 1689-90, when they had ample power to do so, permitted the re-conquest of Ireland and compelled the flight of James.

England's prosperity has grown, is now maintained, and only can be maintained, through her naval power.

"Who can deny," he says, "that the Government which with one hand strengthened its fainting allies on the Continent with the life-blood of money, and with the other drove its own enemies off the sea and out of their chief possessions—Canada, Martinique, Guadaloupe, Havana, Manila—gave to its country the foremost rôle in European politics; and who can fail to see that the power which dwelt in that Government, with a land narrow in extent and poor in resources, sprang directly from the sea?" He does not tire of reminding us that in the last century England steadily aimed at widening and strengthening the basis of her sway upon the ocean; and he remarks that those are true prophets, "though they seem to be having small honor in their own country," who warn England that her prosperity at home depends chiefly upon the maintenance of her power abroad.

Our author displays the greatest boldness in his treatment of the tactics of sailing fleets. The points of resemblance between sailing and steam vessels, which render the handling of one a precedent for that of the other, do not escape him. They have the same power to injure an enemy from a great distance, to manoeuvre for an unlimited length of time without wearing out the men, and to devote the greater part of the crew to the offensive weapons; long-range guns have still the same purpose, and the smashing effect of the carronade is replaced by that of the torpedo; if the weather-gauge was an advantage in a battle of sailing ships, it was because it gave the power of attack, and the same advantage now lies with the squadrons attaining the greatest speed. Pursuing the same lines, Captain Mahan makes an ingenious comparison between fire-ships and torpedo-boats, remarking that the conditions of the usefulness of one may be a subject worthy of study in regard to the other. There is significance in the hint that fire-ships disappeared from fleets because they delayed the speed. The reduced speed of torpedo-boats in heavy weather is well known; and it will be remembered that the seagoing torpedo craft of Admiral Duperré were directed to leave the fleet and seek shelter during the recent French manœuvres.

In enumerating the elements of sea-power, he very naturally dwells upon the advantages England possesses in her geographical position, and there is truth in his remark that, though by her Colonial Empire, she has sacrificed much of this advantage, the sacrifice has been wisely made, for the gain has been greater than the loss; and adds that it has been too often forgotten that England's leadership in mechanical arts conduces to her naval strength.

The "Sea Power" of a commercial people is therefore the most important factor of its national existence, and the power of its commerce is, as a rule, coincident with its power on the sea. Portugal, which rose to eminence through the boldness and enterprise of its navigators, has dwindled into insignificance, and yet at one time she was pre-eminent in discovery and colonization. Every ocean saw her flag and every continent and many islands received her colonists.

The famous navigators of Holland, who brought to that country the tributes of every clime, and filled her coffers with wealth, were the victorious captains of many bloody sea fights.

Sea power has a broad significance both in Peace and War.

America is called a powerful nation, and yet both her Navy and Army are comparatively insignificant.

Just at this time a subject so fraught with interest to the American people has an importance and significance that cannot fail to demand attention. A powerful and world-wide commercial activity has been almost entirely suspended as the one burning result of our protracted strife. While recovering from this disastrous condition, we find ourselves confronted with the fact that a new impulse and a new direction has been given to commercial intercourse by the use of iron and steel. The swift clippers for which America was so famous have been superseded, and to-day the products of the world are brought to us in foreign bottoms, and to foreign bottoms we commit the surplus of our vast resources. How long shall this be? And what is our rank and our power among the Nations while it lasts?

Let us as Americans ponder upon these questions, and while we read with care this elaborate analysis for which we are so much indebted to Captain Mahan, let us hope that Time has in store for us a brighter fortune and a higher measure of Sea Power.

The care with which Captain Mahan pursues his inquiries into the modes by which sea-fights were won, stamps him as possessing one of the brightest minds in our Naval Service.

The statesman who aims at understanding what makes the power or the weakness of a Nation, cannot fail, without negligence, to master the contents of this book, and even the ordinary reader may enjoy the work for the sake of its limpid and flowing style.

"Pawnee Hero Stories and Folk-Tales," Grinnell.

It is not often that a writer possesses the gift of imparting valuable information in language which the simplest may understand and clothed with a grace interesting to both young and old.

Of such a gift, Mr. George Bird Grinnell is the possessor in an eminent degree, and his latest book—"Pawnee Hero Stories and Folk-Tales,"* is one which will be read with pleasure by many officers of the Army, particularly those whose experience carries them back to the days when the plains were "the Plains" indeed, and Indians were "Injuns," and no mistake. There is not a line of the blood and thunder business in it.

It is a collection of stories, taken down, apparently, with little embellishment, from the lips of the older members of the Pawnee tribe, whose feeble remnant to-day can scarcely be recognized as the representatives of the fierce savages who, less than twenty-five years ago, made it questionable whether or not the Kansas Pacific Railway could be pushed to completion.

Where formerly thousands assembled in paint and feathers—clad in beaded buffalo robes—with hair roached so that the head looked like the crest of a Roman helmet—hundreds only can now be counted.

As a historical fact, the Pawnees have been on the down-grade ever since the days of the brave missionary, Father De Smet, who visited them in their lodges on the Loup River, Nebraska, in 1837, when that dire scourge, the small-pox, had swept away three thousand of their people.

From that time, they shrank from the Sioux, although they still carried on their depredations upon the Spanish settlements in exposed sections of what is now New Mexico, and plundered the trains of traders and immigrants on the old "Santa Fé trail."

* New York: Forest and Stream Publishing Company.

With the completion of the Union Pacific Railway, or, perhaps, some time before, they became more friendly in their attitude towards the Government, and a battalion of them entered the military service as scouts, under command of Major Frank North, an excellent and gentlemanly character, to whom this book is appropriately dedicated.

They did good work under Augur, Ord and Crook, and one hundred of them were under the command of the last named in his final campaign against the Sioux and Cheyennes and in the fierce fight on the 25th of November, 1876, in the big Horn Mountains, the last determined effort of those savages to hold that country against the whites.

There are numerous quaint customs of the aborigines cropping out like grass on every page of this interesting book ; of these, we care only to particularize those relating to the right of sanctuary, the modes of salutation, that of counting "coup," in battle, the association of two Indian braves in campaign, one remaining by his comrade under all circumstances and braving all dangers ; the assumption of new names after each battle, or the performance of some daring achievement, and many other points which may be familiar to most of our older officers, but must be new to the generation which has joined since the pacification of the Indian tribes has been effected.

It is a book worthy of perusal by every intelligent reader, especially if connected with the military service.

J. G. B.

The Pharmacology of the Newer Materia Medica.*

Among our more recent exchanges, we find something a little different from the ordinary medical journal, and yet as we sometimes deal in matters medical, we receive it all in good fellowship and wish it a successful journey.

"The Pharmacology of the Newer Materia Medica" deals only with certain of the drugs discovered within the past ten or twelve years ; and its life, in its present form, will be but short.

The study in each case begins with the botany of the plant, runs through its chemistry, pharmacy, and finally a wide range of its therapeutic action, the general conclusions being based on the opinions of many observers. The botany and chemistry of these plants is followed with the greatest care, and the chemistry, in especial, is worked out exhaustively ; this is noticeably so in the articles on the Erythroxylon Coca and its alkaloids and the Rhamnus Purshiana, commonly known as Cascara Sagrada.

No work is known to us containing such a complete study of the chemistry of these plants, and this fact alone at once places this publication in the position ultimately intended for it, as a work of reference. The absence of a careful study of the physiological action of these new drugs, is partly compensated for by the extended review of their therapy, so when completed and carefully indexed, both in *Materia Medica* and *Therapeutics* it will prove a valuable addition to the library of every chemist and physician.

W. E. H.

The Golden Bough, a Study in Comparative Religion.†

This excellent work, in two volumes, handsomely bound and perfect in typographical execution, reflects credit upon its publishers, and will surely add new laurels to those already gained by its learned author.

Professor Frazer's previous work, "Totemism," had prepared the public, in a

*George S. Davis, Detroit, Mich.

†*The Golden Bough. A Study in Comparative religion*, by J. G. Frazer, M.A., Fellow of Trinity College, Cambridge. London and New York: Macmillan & Co., 1890.

measure, for this new proof of his profound scholarship and unwearyed research. There is a wealth of bibliographic references and marginal annotations, in itself a liberal education in this line of study.

The religious thought of Primitive Man—which is only a terse expression for his whole life and conduct, since no act was contemplated or performed save under the guidance of, or in deference to, the powers of the invisible world—will always be to scholars a matter of intense and most fascinating interest.

Professor Frazer has approached his subject with an erudition devoid of pedantry, and a grace of style in which are happily blended purity of diction, simplicity of expression and logical argument. The sections referring to the superstitions connected with human hair, the nails, the worship of trees—curious usages still prevailing in rustic games in Europe—and a great quantity of material of the same type, will be a mine of richness to the professional student, as well as a source of pleasure to the general reader.

Among the many authorities cited we have noted with gratification the names of many officers of the military service whose expeditions, reports, or more formal works have added to the world's knowledge of the habits and customs of our own wild tribes of past days.

Souvenir Album and Sketch Book, First Infantry, I. N. G. of Chicago.

We have received, through the kindness of General James B. Fry, U. S. Army, a handsomely illustrated and printed "Souvenir Album and Sketch Book" of the First Infantry, Illinois National Guard.

The Souvenir is a memento of the dedication of the new armory of the regiment at Chicago. The Sketch Book is beautifully illustrated with portraits of officers, scenes from camp, showing the regiment at artillery and infantry drill, target practice, etc.

The descriptions and letter-press are excellent and reflect great credit upon those to whom the task of editorship and authorship fell.

We heartily reciprocate the sentiment expressed in the "Introductory":—"It is hoped that the Souvenir,—bearing as it does the unaffected good-will of the regiment, breathing the spirit of close comradeship towards its fellow guardsmen of the State and nation, and towards its friends of the Regular establishment—may accomplish something in the pending movement for closer alliance between the Guard in different sections, and between it and the Army."

J. C. B.

United Service Magazine, London.

The United Service Magazine—a name once famous through many decades—has taken a fresh lease of life, and entered on a line suggested by existing conditions. It proposes to review "all questions affecting national interests;" and having a new proprietor, while it retains the well-known title, drops, of course, the prefix "Colburn's," under which the monthly used to travel all over the world. The six numbers before us are well filled, and show that there is not the least notion of making the Review purely technical. It appeals to no section, no party, but handles the questions affecting naval and military defense solely on their merits.

The broad character of the course begun is indicated by the mere list of contributors, which, opening with a paper by Sir Charles Dilke, ends with one from Major-General T. Bland Strange, and includes others by Vice-Admiral Sir George Tryon, K.C.B., Lord Wantage, Sir George Baden-Powell, M.P., and Colonel J. F. Maurice. The range of subjects is wide, and every one is interesting. Sir Charles Dilke dis-

courses on "Our War Organization of the Future." He wants to create a general staff, with a responsible chief to advise and guide the Secretary of State for War.

Major-General Bland's paper on "Obstacles to Imperial Federation" is a cognate topic, because it deals with many burning questions more or less the sport of "politicians." Moved by the trash talk at the "Panorama," Colonel Maurice gives a series of most interesting and instructive articles on the facts of "The Waterloo Campaign," never more lucidly set forth in outline, and followed by comments and explanations which he is so competent to offer, on the deeply interesting questions they raise.

The whole contents of the magazine are full of life.

Those articles most interesting to the American reader, besides the ones mentioned, are : "Responsibility in War," by Spencer Wilkinson ; "The Soudan Campaign," by George Hooper ; "The Canadian Militia," by the Marquis of Lorne ; "The Re-Armament of the German Army;" "The Command of the Army and General Staff in France;" "The Smoke Attack," by Mark Hamilton ; "The Cavalry Revival—A Plea for Infantry," by Captain E. A. Altham ; and last and best, "A Summer Night's Dream," which we have taken the liberty of reprinting.

FOR REVIEW.

Souvenir Album and Sketch Book. First Infantry, I. N. G. of Chicago. By Lieut.-Col., Henry L. Turner. Chicago, 1890.

A Course of Instruction for Non-Commissioned Officers. By Harvey C. Carbaugh, 1st Lieut., 5th Artillery. Artillery School Press, Fort Monroe, Va.

Stratégie Tactique et Politique. Par le Général Jung. Paris, 1890.

Pawnee Hero Stories and Folk-Tales. By George Bird Grinnell. New York : Forest and Stream Publishing Co., 1889.

Campaigning with Crook. By Charles King, Captain U. S. Army. New York : Harper & Bros., 1890.

Handbook of Problems in Direct Fire. By Captain James M. Ingalls, 1st Regiment Artillery, U. S. Army. New York: John Wiley & Sons, 1890.

Notes on Military Hygiene, for Officers of the Line. A syllabus of lectures at the U. S. Infantry and Cavalry School. By Alfred A. Woodhull, Major Med. Dept., Bvt Lt.-Col., U. S. A. New York : John Wiley & Sons, 1890.

OUR EXCHANGES.

ARTICLES OF MORE OR LESS MILITARY INTEREST.

ARGENTINE REPUBLIC.

Revista de la Union Militar. (July and August, 1890.)

Revista Científico Militar. (June.)

Boletin del Centro Naval. (May.)

BELGIUM.

La Belgique Militaire. Study on our Cavalry. The New English Rifle. Firing Experiments.

ENGLAND.

Proceedings of the Royal Artillery Institution. (August, 1890) The Military Defense Forces of the Colonies. A Range and Training Indicator.

The Illustrated Naval and Military Magazine. (August, 1890) Epochs of the British Army. Great Commanders of Modern Times. Napoleon. Naval Warfare. French Torpedo Vessels in 1890. The American War, 1861-1865. Some Russian Ideas on Fortification. The Haversack. (September) Recent Changes in the German Army. Naval Warfare.—XV. British Battle-fields in Portugal. The American Naval War of 1812. Scientific and Humane Horse-Taming. The Bulgarian Army.

Journal of the Royal United Service Institution. (Vol. 34, No. 153) The Drill and Training of Volunteer Infantry. Infantry Training. The Sanitation of Barracks. Notes on the Defense of a Modern Fortress. Cavalry Equipment. Organization and Distribution. Naval Warfare, 1860-1889. System of Signalling Between Man-of-War and Merchant Vessels.

The United Service Magazine. (June, 1890) The Canadian Militia. A Summer Night's Dream. A Conference of the Powers. (July) The Re-Armament of the German Army. The Best Mounted arm for the Volunteers. The African Mania. (August) National Insurance. The East in 1890. The Present State of the Powder Question. The Command of the Army and the General Staff in France. A Naval General Staff.

The United Service Magazine. (September, 1890) The War Training of the Navy. —II. How the Political and Military Power of England is Affected by the Suez Canal. The Clothing of the Army. Defects in Administration. Waterloo.—V. Historical Difficulties. The Three Staffs. The Smoke Attack.

FRANCE.

Revue Militaire de L'Etranger. (July and August, 1890) War Schools in Russia. The Law of July 15, 1890 and the Peace Effectives of the German Army. The Military Constitution of Roumania. The Manufacture of Rifles for the Hungarian Landwehr.

Revue du Cercle Militaire. The Trans-Saharan Railway. Roman Fortification. The New Austro-Hungarian Musketry Regulations. Regulations for Manoeuvres. The New German Musketry Instructions.

Le Progrès Militaire (To date). The Revolution in Cavalry Tactics. The Manoeuvres of 1890.

INDIA.

Journal United Service Institution of India. (Vol. 19, No. 81, 1890) The Organization and Employment in War of Native Cavalry. (Prize Essay).

ITALY.

Rivista di Artiglieria e Genio. (June, July and August, 1890) The Walls of Rome. On the Use of Mineral Oil for Lubrication. A New Method of Determining the Velocity of Projectiles in the Gun. Changes in the Matériel of the French Field Artillery.

NEW SOUTH WALES.

United Service Institution of New South Wales. The Australian Soldier. Lecture by Capt. M'Cutcheon, 1st Reg't. Vol. Infantry. (Hon. Sec.)

SPAIN.

Memorial de Artilleria. (July and August, 1890.)

UNITED STATES.

The Century. (September, 1890) Our New Naval Guns. The Autobiography of Joseph Jefferson. XI. How California came into the Union. The California Boundary Question in 1849. In the Marble Hills. (October) The Autobiography of Joseph Jefferson, Conclusion. An Artist's Letters from Japan. In Dark New England Days. Partisan Recognition of the Independent Voter. The Merit System in the Fifty-first Congress. An Anecdote of Sheridan. McClellan's Candidacy with the Army.

The North American Review. (September, 1890) The Federal Election Bill. Our Fur-Seal Fisheries. The McKinley Bill in Europe. The Pan-American Conference. Client and Architect. (October) A Word as to the Speakership. A Key to Municipal Reform. Crowns and Coronets. The Future of American Universities. Labor Tendencies in Great Britain. The Peculiarities of the South.

The Popular Science Monthly. (September, 1890) Some Natives of Australasia. Wild Horses. The African Pygmies. Sketch of Thomas Corwin Mendenhall. (October) Barrier Beaches of the Atlantic Coast. Invisible Assailants of Health. Irrigation in China. Rice and its Culture.

Proceedings of the United States Naval Institute. (Vol. 16, No. 54) Navy Boats. The Howell Automobile Torpedo. Desertion and the Bertillon System for the Identification of Persons. Naval Training.

Harper's Monthly Magazine. (September, 1890) Across the Andes. Mountain Passes of the Cumberland. Harvard University in 1890. The Social Side of Yachting. The Stone Axe. (October) New Moneys of Lincoln's Administration. A White Uniform. Antoine's Moose-yard. The Dragoness. Port Tarascon.

The Railroad and Engineering Journal. (September, 1890) The Harlem River Bridges. The Isthmus Canals. The New Battle Ships. The Development of Armor. United States Naval Progress.

Political Science Quarterly. (September, 1890) Recent Centralizing Tendencies. State Control of Corporations. German Historical Jurisprudence.

Magazine of American History. (September, 1890) The Rifle in Colonial Times. The Battle of Queenstown Heights. Dead Man's Island and the Ghost Ship. Judge Amasa J. Parker. (October) The American Flag and John Paul Jones. About Some Public Characters in 1786. Anecdotes of General Grenville M. Dodge. The Story of Roger Williams retold.

The United Service. (September, 1890) The Capture of Philadelphia and the Attack of the British Fleet on the Defenses of the Delaware, 1777. Napoleon II. History of the Mormon Rebellion of 1856-57. Obligatory Military Service for the Spanish-American Republics.

Transactions of the American Society of Civil Engineers. (May, 1890) A New Graphical Solution of the Problem. What Position a Train of Concentrated Loads must have in Order to Cause the Greatest Stress in any given Part of a Bridge, Truss, or Girder. (June) A Method of taking Cross-Sections in Deep Rock Cuts by Triangulation. Observations on the Forth Bridge.

Pennsylvania Magazine of History and Biography. (October, 1890) Itinerary of General Washington from June 15, 1775, to December 23, 1783. The Leaders of the Old Bar of Philadelphia.

Monthly Weather Review (To date).
Publications of Department of Agriculture (To date).
Science (To date).
The Army and Navy Register (To date).
Philadelphia Weekly Times (To date).
The Boston Courier (To date).
Home and Country (To date).
Kansas City Times (To date).
Table Talk (To date).
The Electrical World (To date).
The New York Critic (To date).
Pharmacology of the Newer Materia Medica (To date).
The Johns Hopkins University Publications (To date).
The 7th Regiment Gazette (N. Y.) To date.
St. Nicholas (To date).
Outing. (October, 1890) Rancho del Muerto. The National Guard of Minnesota.
The Pheasant in Old Britain. Fox Hunting in the Genesee Valley. Cycling
Round and About My Home. A Canoe Trip down the Chippewa.

Historical Sketches of the Army.

THE following named officers have volunteered, or have been designated, to prepare Historical Sketches of their Corps or Regiments for publication in this JOURNAL.

<i>Medical Department</i>	SURGEON CHAS. SMART.
<i>Pay Department</i>	MAJOR A. B. CAREY.
<i>Signal Corps</i>	LIEUT. WM. A. GLASSFORD.
<i>1st Cavalry</i>	LIEUT. R. P. P. WAINWRIGHT.
<i>2d Cavalry</i>	MAJOR A. E. BATES.
<i>3d Cavalry</i>	LIEUT. THOS. B. DUGAN.
<i>5th Cavalry</i>	CAPT. CHAS. KING.
<i>6th Cavalry</i>	LIEUT. F. G. HODGSON.
<i>7th Cavalry</i>	LIEUT. E. A. GARLINGTON.
<i>1st Artillery</i>	COLONEL L. L. LANGDON.
<i>4th Artillery</i>	LIEUT. A. B. DYER.
<i>2d Infantry</i>	GEN. FRANK WHEATON.
<i>3d Infantry</i>	CAPT. WM. GERLACH.
<i>4th Infantry</i>	LIEUT. JAS. A. LEYDEN.
<i>6th Infantry</i>	LIEUT. CHAS. BYRNE.
<i>7th Infantry</i>	LIEUT. A. B. JOHNSON.
<i>8th Infantry</i>	LIEUT. W. P. RICHARDSON.
<i>9th Infantry</i>	LIEUT. E. B. ROBERTSON.
<i>10th Infantry</i>	LIEUT. S. Y. SEYBURN.
<i>11th Infantry</i>	LIEUT. R. C. J. IRVINE.
<i>12th Infantry</i>	LIEUT. CHAS. W. ABBOT, JR.
<i>13th Infantry</i>	LIEUT. M. J. O'BRIEN.
<i>14th Infantry</i>	COLONEL T. M. ANDERSON.
<i>15th Infantry</i>	LIEUTS. G. K. McGUNNIGH and G. A. CORNISH.
<i>16th Infantry</i>	CAPT. WM. V. RICHARDS.
<i>17th Infantry</i>	LIEUT. GEORGE RUHLEN.
<i>18th Infantry</i>	COLONEL H. M. LAZELLE.
<i>19th Infantry</i>	LIEUT. C. C. HEWITT.
<i>20th Infantry</i>	CAPT. J. N. COE.
<i>21st Infantry</i>	COLONEL H. A. MORROW.
<i>24th Infantry</i>	LIEUT. H. W. HOVEY.

THE PAY DEPARTMENT.

BY COLONEL A. B. CAREY, U. S. ARMY.

PAY DEPARTMENT.

THE earliest legislation creating a Pay Department, is the resolution of the Continental Congress, in session at Philadelphia, Pa., June 16, 1775, as follows:

Resolved, "That there be one Paymaster General, and a Deputy under him, for the Army, in a separate department; that the pay for the Paymaster General himself be one hundred dollars per month, and for the Deputy Paymaster under him, fifty dollars per month."

James Warren, of Massachusetts, was elected Paymaster-General, by Congress, on July 27, 1775.

By resolution of January 9, 1776, the Deputy Paymaster-General was authorized to appoint two Assistant Paymasters, and it was required that all the troops of the Northern Department be paid in person by him or his assistants.

Colonel Warren's resignation was accepted by Congress on the 19th of April 1776, and on the 27th William Palfrey, of Massachusetts, then aide-de-camp to General Washington, was appointed by Congress Paymaster-General of the Army, and on June 12, Ebenezer Hancock was appointed Deputy Paymaster-General for the Eastern Department.

Congress on the 9th of July, 1776, resolved: "That Mr. Palfrey, late aide-de-camp of General Washington, have the rank of Lieutenant-Colonel in the Continental Army," and on the 16th a regimental paymaster for each regiment was provided at a salary of \$26 $\frac{2}{3}$ per month, and by resolution of October 10th, regimental paymasters were to have "the rank of First Lieutenants and rations as Captains."

Deputy Paymaster-Generals were appointed by Congress for Virginia and Pennsylvania on July 11, 1777, and for Georgia on August 6th. On the 20th the pay of the Paymaster-General was increased to \$150, and that of the Deputy under him to \$75 per month. By the resolution of August 28th, the Deputy Paymaster-Generals of the Northern, Eastern and Southern Departments were empowered to appoint assistants when necessary. On May 27, 1778, Congress resolved, "That the paymaster of a regiment be chosen by the officers of the regiment out of the captains or subalterns, and appointed by warrant issued by the Commander-in-chief, or the commander in a separate department." They were required to take charge of the clothing for the troops, and to distribute the same. By resolution of January 21, 1779, Congress directed that the Paymaster or Deputy Paymaster-General should provide an office near headquarters, and on May 29th, the Paymaster-General was required to keep his office in the place where

Congress should, from time to time, hold its sessions. Authority was given for the employment of clerks, directions for keeping regular books; and, in general terms, the duties of the office were defined. A Deputy Paymaster-General was authorized, by the same resolution, for the army under the immediate command of General Washington. On November 12, 1779, Congress granted the sum of \$20,000 to Paymaster-General William Palfrey, as a further compensation for past services, and allowed the Paymaster-General salary at the rate of \$14,000 per annum until further order of Congress. Colonel Palfrey had filled the office of Paymaster-General since April, 1776. "During this period he had exhibited such proofs of his talents for business, fidelity and devotedness to the cause of his country, that, on the 4th of November, 1780, he was elected Consul General from the United States to France, an office at this time of much consideration, as it involved the duties of making extensive purchases of military and other supplies for the country, and an examination and settlement of all the accounts in which the United States were concerned with public and private agents in Europe, and which had been multiplying and accumulating since the commencement of the war.

"He sailed for France, but the vessel in which he took passage was lost at sea, and every one on board was supposed to have perished."^{*}

Colonel Palfrey was succeeded as Paymaster-General by John Pierce, of Connecticut, who was elected to the office by Congress on January 17, 1781.

General officers had been empowered by Congress to draw warrants on the Paymaster-General for payment of troops under their command. On a report from the Secretary of War, to whom was referred a plan of the Paymaster-General for the better regulation of the pay of the army, Congress, on April 8, 1782,

Resolved, "That as all returns necessary to check the accounts of pay and rations, and to give full information of public issues of cloathing and stores, are lodged at the War Office, the Secretary of War is hereby empowered and directed to issue his warrants on the Paymaster-General, in favor of each regimental paymaster, for the pay and rations which shall appear, on adjustment of their accounts to be due to the regiments respectively, and to the head of each department, for the pay and rations due to such department; that the accounts for the pay and rations of each regiment, and of each department in the army, from January 1, 1782, shall be made out at the end of every month, and be transmitted to the War Office for examination and warrants:

"That the manner of making the payments, of keeping the accounts, and the returns of the regimental paymasters be regulated by the Secretary of War:

"That the Paymaster-General shall pay on the warrants of the Secretary of War, from such monies as shall be put into his hands for the pay and rations of the troops, and to the orders of the Commander-in-Chief, or officer commanding the Southern army, from such monies as shall be placed in his disposal for contingencies.

Resolved, "That all resolutions heretofore passed empowering general officers to draw warrants on the Paymaster-General, except that empowering the officer commanding the Southern army, be, and the same are hereby repealed."

* Spark's Writings of Washington.

Resolved, "That there be one Deputy-Paymaster for the Southern army:

"That there shall be one assistant allowed to the Paymaster-General, who shall do the duties of a clerk:

"That the Paymaster-General be, and he is hereby, authorized to appoint his deputy and his assistant:

"That the Paymaster-General immediately give bonds with two sureties, to the Superintendent of Finance, in the sum of \$15,000, for the faithful performance of his office."

The Paymaster-General was authorized, on May 16th, to appoint a Deputy-Paymaster to reside with the main army.

The Revolutionary army was disbanded on the 3d of November, 1783, in pursuance of a proclamation issued by Congress on the 18th of October previous. On April 1, 1785, Congress resolved that 700 troops were necessary for the protection of the north-western frontier, and on April 12, 1785, specified the number which should be furnished by certain States, and provided that a lieutenant should act as Paymaster.

The resolve of Congress of the 20th of October, 1786, increased the number to 2040 non-commissioned officers and privates. The army was fixed by the resolve of October 3, 1787, at

1 regiment of Infantry, 8 companies.

1 battalion of Artillery, 4 companies.

Paymaster-General John Pierce had been continued in service settling his accounts, and as commissioner for settling the accounts of the army. The two offices were united by resolution of Congress of March 23, 1787, as follows:

Resolved, "That the services and duties of Paymaster-General be, and hereby are, united with those of Commissioner of Army Accounts." John Pierce died in August, 1788.

The first session of the first Congress of the United States was held on the 4th of March, 1789, at New York.

The Act of September 29, 1789, recognized the force authorized by the resolve of October 3, 1787, "to be the establishment for the troops in the service of the United States." The pay and allowances were to be the same as had been established by the resolution of April 12, 1785.

The Act of April 30, 1790, directed an increase of the force, and provided a paymaster for the battalion of artillery.

After the death of John Pierce in 1788, the duties of the office of Paymaster-General were administered by Joseph Howell, Jr., Commissioner of Army Accounts, until a paymaster for the Army was provided by the Act of May 8, 1792, as follows:

Section 3. "That there be a paymaster to reside near the headquarters of the troops of the United States. That it shall be the duty of the said paymaster, to receive from the treasurer, all the monies which shall be intrusted to him for the purpose of paying the pay, the arrears of pay, subsistence, or forage, due to the troops of the United States. That he shall receive the pay abstracts of the paymasters of the several regiments or corps, and compare the same with the returns or muster rolls which shall accompany the said pay abstracts. That he shall certify, accurately, to the commanding officer, the sums due to the respective corps, which shall have been examined

as aforesaid, who shall thereon issue his warrant on the said deputy paymaster for the payment accordingly. That copies of all reports to the commanding officer, and the warrants thereon, shall be duly transmitted to the office of the accountant of the War Department, in order to be there examined, and finally adjusted at the Treasury. That the said paymaster shall give bond in the sum of \$20,000, with two sufficient sureties, for the faithful discharge of his duty; and he shall take an oath faithfully to execute the duties of his office. That the compensation to the said paymaster shall be \$60 monthly, with the same rations and forage as a major."

Caleb Swan, of Massachusetts, was appointed Paymaster of the Army on May 8, 1792, and continued in the office until the 30th of June, 1808.

Act of May 9, 1794, directed the raising of 764 enlisted men, to be incorporated with the Corps of Artillery, and to be denominated the Corps of Artillerist, and Engineers, of four battalions, with an adjutant and paymaster to each battalion.

A Paymaster-General was provided by the act approved May 30, 1796, and it was further provided that paymasters of regiments should be appointed from the subalterns of their respective regiments. The general staff authorized by the act was to continue in service until the 4th of March following, and no longer.

Act of May 3, 1797, to amend and repeal in part the previous act, provided for a Paymaster-General.

A regiment of Artillerists and Engineers was provided by the act of April 27, 1798, with an Adjutant and Paymaster to each battalion.

The act of May 28, 1798, to raise a provisional army, provided for the employment of a Paymaster-General, by and with the advice and consent of the Senate, who should have the rank, pay, and emoluments of a Lieutenant-Colonel.

The act of July 16, 1798, to augment the Army of the United States, provided for the appointment of one Paymaster to each regiment.

The act for the better organizing of the troops of the United States, and for other purposes, approved March 3, 1799, provided for one Paymaster to each regiment of cavalry, artillery and infantry. The same act provided for the appointment of Deputy Paymasters, and prescribed the bond to be given by the several regimental paymasters, as follows:

Section 15. "That the Paymaster-General of the armies of the United States, shall always quarter at or near the headquarters of the main army, or at such place as the Commander-in-Chief shall deem proper; and that, to the army on the western frontiers, and to detachments from the main army, intended to act separately for a time, he shall appoint Deputy Paymasters, who shall account to him for the money advanced to them, and shall each give a bond, in the sum of \$15,000, with sufficient sureties, for the faithful discharge of their duties respectively, and take an oath faithfully to execute the duties of their offices; and the several regimental paymasters shall also give bond, in the sum of \$5000, with one or more sufficient sureties, and take an oath, as aforesaid, for the faithful discharge of the duties of their offices respectively; and that the Paymaster-General shall receive \$80 per month, with the rations and forage of a major, in full compensation for his services and travelling expenses; and the deputy, in addition to his pay, and other emoluments, \$30 per month, in full compensation for his extra services and travelling expenses."

Act of March 16, 1802, fixing the military peace establishment, provided that from and after June 1, 1802, the peace establishment should be composed of one regiment of artillerists, two regiments of infantry, and a corps of engineers. Section 3 of this act provides:

"One Paymaster of the Army, seven paymasters, and two assistants, to be attached to such districts as the President of the United States shall direct, to be taken from the line of commissioned officers, who, in addition to their other duties, shall have charge of the clothing of the troops." With pay as follows: "To the Paymaster of the Army, \$120, without any other emolument, except such stationery as may be requisite in his department and the use of the public office now occupied by him; each Paymaster attached to districts, \$30, and each assistant to such Paymaster, \$10, in addition to his pay in the line."

Section 13 of this act provides:

"That the said corps shall be paid in such manner that the arrears shall at no time exceed two months, unless the circumstances of the case shall render it unavoidable."

Section 16:

"That the Paymaster shall perform the duties of his office, agreeably to the direction of the President of the United States, for the time being: [and before he enters on the duties of the same, shall give bonds, with good and sufficient sureties, in such sums as the President shall direct, for the faithful discharge of his said office; and shall take an oath to execute the duties thereof with fidelity; and it shall, moreover be his duty to appoint from the line, with the approbation of the President of the United States, the several Paymasters to districts and assistants prescribed by this act; and he is hereby authorized to require the said Paymasters to districts, and assistants, to enter into bonds, with good and sufficient surety, for the faithful discharge of their respective duties]."

The Act of March 16, 1802, seems to have done away with regimental and battalion paymasters, but the office was again created by the act of April 12, 1808, which provided an additional military force of five regiments of infantry, one of riflemen, one of light artillery, and one of light dragoons, with one paymaster to each regiment, with \$10 per month in addition to pay in the line, and \$6 for forage when not furnished in kind.

Caleb Swan resigned as Paymaster of the Army on the 30th of June, 1808, and was succeeded by Robert Brent, of the District of Columbia.

The act of January 11, 1812, provided one Paymaster to each of the ten regiments of infantry, two of artillery and one of light dragoons raised by that act. The act of April 29, 1812, provided a Paymaster for the Corps of Engineers, to be taken from the subalterns. This was repealed by the act of July 5, 1838, which provided for transfer of the Paymaster of the Corps of Engineers to the Pay Department of the army.

The act May 16, 1812, provided:

"That the President of the United States be, and he hereby is, authorized and empowered to appoint so many district paymasters as, in his judgment, the service may require; and, if such paymasters are taken from the line of the army, they shall respectively, receive \$30 per month, in addition to their pay in the line: *Provided*, The same shall in no case exceed the pay and emoluments of a major; and, if not taken from the line, they shall receive the same pay and emoluments as a major of infantry."

Section 2:

"That the President of the United States be, and he hereby is, authorized and empowered to appoint a paymaster to each regiment on the peace establishment, who shall receive the same pay and emoluments as a captain of the regiment to which he belongs: *Provided*, That all district and regimental paymasters shall be subject to the rules and articles of war, and give such bonds to the United States as the secretary of the department of war may direct, for the faithful performance of their duties. And it shall be the duty of the commanding officer, when requested by the paymaster, to furnish a capable non-commissioned officer or soldier to aid him in the discharge of his duty, who, while so employed, shall receive double pay.

The act of June 26, 1812, provided that there be one paymaster to each regiment authorized by that act. And the act of July 6, 1812, authorized the President to appoint one Deputy Paymaster General from the line, to any army, other than that in which the Paymaster of the Army shall serve, with \$50 per month in addition to his pay in the line, "and assistant deputies (not exceeding three to each department) as the public service may require, who shall, in like manner, be taken from the line, and who shall, each, be entitled to \$30 per month, in addition to his pay and other emoluments, which shall be in full compensation for his extra services."

The act of January 29, 1813, provided one paymaster for each regiment raised under that act, and the acts referred to therein; as does the act of February 10, 1814, entitled "An act to raise three regiments of riflemen."

Section 20 of the act of March 30, 1814, provided "That in no case shall the district paymasters or quartermasters of any grade be taken from the line of the army," and this act does not provide Regimental or Battalion Paymasters for the organizations created by it.

The act of April 18, 1814, fixed the annual salary of the Paymaster of the Army at \$2000, and allowed a sum for clerk hire and contingent expenses of office. Also authorized the appointment of Assistant District Paymasters, and defined the duties of Paymaster, District and Assistant District Paymasters.

The act of March 3, 1815, reduced and fixed the military peace establishment at 10,000 men, and provided that there should be one Paymaster to each regiment, to be taken from the subalterns of the line.

By this act the office of District and Assistant District Paymaster was abolished, but the act did not affect the office of Paymaster of the Army, or of Deputy Paymaster General. By Executive General Orders of May 17, 1815, two Deputy Paymasters and two Assistant Deputy Paymasters were provisionally retained.

The act of April 24, 1816, organizing the general staff and making further provision for the Army of the United States, provided for a Pay Department as follows:

Section 3, "That the pay department shall consist of one paymaster general of the army, with the annual salary of two thousand five hundred dollars, and that, in addition to regimental paymasters, there be appointed one paymaster to each battalion of the corps of artillery, who, as well as the regimental paymasters, in addition to the regular and punctual payment of their respective regiments or corps, shall discharge the duties of district paymasters within such district as shall, from time to time, be

assigned them by the paymaster general, under the direction of the secretary of war. *Provided*, That regimental and battalion paymasters may be taken either from the subalterns of the army, or citizens, and appointed by the President of the United States. *Provided, also*, That regimental and battalion paymasters shall receive the pay and emoluments of major, and shall be allowed a capable non-commissioned officer as clerk, who, while so employed, shall receive double pay, and the actual expense of transportation while traveling under orders in the discharge of his duty."

Section 4 of this act defines the duties of regimental and battalion paymasters.

Section 6 prescribes that good and sufficient bonds shall be given.

Robert Brent resigned as Paymaster General on the 28th of August, 1819, and was succeeded by Nathan Towson, of Maryland. Colonel Towson was appointed Colonel, Second Artillery, on the 1st of June, 1821, but his appointment was negative by the Senate. On the appointment of Colonel Towson to the Artillery, June 1, 1821, Daniel Parker, of Massachusetts, then Adjutant and Inspector General of the Army, was appointed Paymaster General, but was superseded on the 8th of May, 1822, by the re-appointment of Colonel Towson, who continued in office as Paymaster General of the Army until the date of his death.

Section 9 of the act of March 2, 1821, provided "That there shall be one paymaster general, with the present compensation, and fourteen paymasters with the pay and emoluments of regimental paymasters."

In the annual report of Paymaster General B. W. Brice, for 1868, General Towson is referred to as the author of the present organization of the Pay Department and the arrangement of its duties, giving to paymasters the field grade of major, and making it an independent staff corps. In a report dated April 29, 1839, to the Secretary of War he (Towson) gives the following facts in the history of army paymasters:

First.—From 1808 to 1811, before the war, the average annual loss by the defalcation of regimental and battalion paymasters amounted to 1.58 per centum on the amount disbursed, and the annual average expenses for paying the army to 3.10 per centum.

Second.—From the beginning of the war to 1816, under the same system, these averages were: defalcations, 2.98 per cent., and the expenses, 4.36.

Third.—From the date of the reorganization, in 1821, on the new plan (the present one) to 1825, the average defalcations were 22-100; little more, it will be perceived, than the one-fifth of one per cent., which was finally paid into the Treasury; expenses for the same period, 2.13.

Fourth.—From 1825, after the new system had been well established, *not one dollar of defalcation*, and the total average expenses reduced to one and one-third per cent.

Section 4 of the act of July 14, 1832, provided, "That it shall be the duty of the district paymasters of the army of the United States, in addition to the payments required to be made by them to the regular troops, to make payment to all other troops in the service of the United States, whenever required thereto by order of the President."

"Section 2 of the act of March 2, 1833, authorized the Secretary of War to allow, and pay, district paymasters a commission, not exceeding

one per centum upon the amounts paid by them, respectively, to the militia ordered into the service of the United States according to law.

The act of July 4, 1836, authorized the appointment of three paymasters, and provided for the detail of any officer of the army to the duty of Paymaster, when volunteers or militia were called into service.

This is replaced in part by section 25 of the act of July 5, 1838, and modified by section 31 of the same act, which prohibits the separating of any officer of the line of the army, employed as Paymaster, from his regiment or company. (See R. S. sec. 1224.)

Section 24, act of July 5, 1838, provides: "That hereafter the officers of the pay and medical departments of the army shall receive the pay and emoluments of officers of cavalry of the same grades respectively according to which they are now paid by existing laws."

Section 25 provides for a temporary expansion of the Pay Department whenever militia or volunteers are called into service, as follows:

"That when volunteers or militia are called into the service of the United States, so that the paymasters authorized by law shall not be deemed sufficient to enable them to pay the troops with proper punctuality, it shall be lawful for the President to appoint as many additional paymasters as he shall deem necessary, who shall perform the same duty, give the same bond, be subject to the same liability, and receive the same pay and emoluments, as are now provided for paymasters of the army. *Provided, however,* That the number so appointed shall not exceed one for every two regiments of militia or volunteers: *And provided also,* That the persons so appointed shall continue in service only so long as their services are required to pay militia and volunteers."

Under the authority given by the foregoing section of July 5, 1838, the Pay Department was increased during the war with Mexico and the war of the rebellion by the appointment of a number of Additional Paymasters sufficient for the payment of the volunteer force called into the service of the United States, as follows:

ADDITIONAL PAYMASTERS.

Employed during war with Mexico.....	17
Accounted for as follows :	

Died.....	2
Resigned.....	2
Discharged (disbanded March 4, 1849).....	9
Retained in permanent establishment.....	4
	17

Subsequently appointed in permanent establishment.....	1
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Employed during the war of the rebellion.....	562
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Died.....	28
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Resigned.....	171
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Cashiered.....	3
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Dismissed.....	14
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Honorably mustered out of service.....	318
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Retained in permanent establishment.....	28
--	----

562

Subsequently appointed in permanent establishment.....	17
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Section 9 of the act of July 7, 1838, allowed the Paymaster-General and Surgeon-General of the army the additional rations for every five years' service, granted by the act of July 5, 1838.

The act of June 17, 1846, authorized an increase of three paymasters.

The department was again increased by section 12 of the act of March 3, 1847, which authorized the President "to add to the pay department of the army two deputy paymaster-generals, with the pay and allowances, each, of a deputy quartermaster-general, and ten paymasters, with the pay and allowances, each of a paymaster of the army; and the officers so appointed shall give such bonds as the President shall, from time to time, direct: *Provided*, That the deputy paymaster-generals shall, in addition to paying troops, superintend the payment of armies in the field."

The ten paymasters appointed under this act were to be disbanded on the 4th of March, 1849, under section 3 of the act of July 19, 1848.

Section 13: That the officers of the pay department shall have rank corresponding with the rank to which their pay and allowances are assimilated: *Provided*, That paymasters shall not in virtue of such rank be entitled to command in the line or other staff departments of the army: *Provided, also*, that the right to command in the pay department, between officers having the same rank, shall be in favor of the oldest in service in the department, without regard to the date of commission under which they may be acting at the time."

The last proviso of this section being sequent upon the act of May 15, 1820, which required a reappointment every four years, is obsolete; rank being determined by date of commission or appointment.

Section 14. "That all paymasters hereafter to be appointed by the President for the volunteer service of the United States shall be nominated to the Senate for confirmation to such office."

The act of August 12, 1848, authorized the Paymaster-General to allow to any Paymaster of the army who had been employed in the payment of volunteers, during the war with Mexico, a commission, not exceeding one-half of one per centum, on all sums disbursed by them to volunteers, provided said commission did not exceed \$1000 per annum, from commencement to close of the war.

The act approved March 2, 1849, provided

"That the pay department of the army shall consist of a paymaster-general, who shall have the rank of colonel, and the same pay and allowances as are at present provided by law for such officers, and the same tenure of office as the heads of other disbursing departments of the army; two deputy paymasters-general, with the same rank, pay and allowances as are now provided by law for such officers, and the same tenure of office as officers of like grade in other disbursing departments of the army; and twenty-five paymasters, with the same rank, pay, and allowances as are now provided by law for such officers, and the same tenure of office as officers of like grade in other disbursing departments of the army. That it shall be the duty of all disbursing officers of the pay department to renew their bonds, or furnish additional security, at least once in four years, or as much oftener as the President may direct.

"That the officers of the Pay Department, provided for by the first section of this act, shall consist of the paymaster-general, the two deputy paymasters-general now in commission, the fifteen paymasters who were in service under the acts in force at the

commencement of the war with Mexico, and ten paymasters to be selected from the additional paymasters now in service, and the thirteen paymasters authorized by the acts of the 17th of June, 1846, and the 3d of March, 1847."

There does not appear to have been any further legislation relative to the Pay Department, and the organization, as provided by the above act, continued until 1866. Colonel Nathan Towson died at Washington, D. C., on the 20th of July, 1854, and was succeeded as Paymaster-General, by the promotion of Colonel Benjamin F. Larned, of Massachusetts, then Deputy Paymaster-General, who continued in office to the date of his death, at Washington, D. C., September 6, 1862.

Colonel Timothy P. Andrews, of the District of Columbia, then Deputy Paymaster-General, was promoted to be Paymaster-General, on September 6, 1862, and continued in the office until he was retired, on his own application, after forty or more consecutive years of service, in conformity with Section 15 of the act of August 3, 1861. Colonel Andrews was succeeded by Benjamin W. Brice, of Virginia, then a Major and Paymaster, fifth in rank in the Pay Corps, who was appointed Paymaster-General, November 29, 1864, with the rank of Colonel, to July 28, 1866, and Brigadier-General since that date.

The statistics of the Pay Department show that during the war of the rebellion, in which it disbursed \$1,100,000,000, the defalcations and losses of all kinds were less than one-tenth of one per cent., and the cost of paying the troops, including expenses, defalcations and losses of all kinds, falls short of three-fourths of one per cent. on the amount disbursed; that chiefly within the three months of June, July and August, 1865, \$270,000,000 were paid to 800,000 individual men by the small regular force of the Pay Department and the additional force employed under the act of July 5, 1838, which drew from General Brice the following in his annual report for 1865:

"No similar work of like magnitude, regarding its immensity both as to men and money and the small limit of time in which it has been performed, has, it is believed, any parallel in the history of armies * * *," and vindicates the language used by him: "No system can be devised which, equal to the present one, can be made to combine the advantages of prompt payment, the safety of the public money, and an accurate and prompt accountability, with the least possible liability to embezzlement or corrupt defalcation."

Section 18 of the Act of July 28, 1866, provided "That the pay department of the army shall hereafter consist of one paymaster-general, with the rank, pay, and emoluments of a brigadier-general; two assistant paymasters-general, with the rank, pay, and emoluments of colonels of cavalry; two deputy paymasters-general, with the rank, pay, and emoluments of lieutenant-colonels of cavalry; and sixty paymasters, with the rank, pay, and emoluments of majors of cavalry, to be selected from persons who have served as additional paymasters."

Section 23 provides that the Paymaster-General shall be appointed by selection from the Corps to which he belongs.

Section 6 of the act of March 3, 1869, prohibited new appointments and

promotions in the Pay Department, but was so far modified by the act of June 4, 1872, as to authorize the President to "appoint a Paymaster-General, with the rank, pay and emoluments of a colonel, to date from the time the appointee assumed the duties of the office, to fill the vacancy now existing.

General Brice at his own request was retired from active service on January 1, 1872, in conformity with Section 12 of the act of July 17, 1862.

Benjamin Alvord, of Vermont, then a Major and Paymaster, fourth in rank in the Pay Corps was selected and appointed Paymaster-General of the army, with the rank of Colonel, from January 1, 1872.

The act of March 2, and Joint Resolution of March 3, 1875, established the number of paymasters at fifty and authorized the appointment of majors; and by the act of July 22, 1876, the rank of paymaster-general was made brigadier-general, under the authority of which General Alvord was appointed brigadier-general.

The act of March 3, 1877, repealed so much of the act of March 3, 1869, as prohibited promotions in the Pay Department.

General Alvord was retired on June 8, 1880, at his own request, having served over forty years (Sec. 1243 R. S.); and Nathan W. Brown, of New York, the senior colonel, was selected and appointed Paymaster-General same date, and retired on the 6th of February, 1882, under the provisions of Sec. 1244 R. S.

William B. Rochester, of New York, then a major and paymaster, tenth in rank in the pay corps, was selected and appointed paymaster-general on February 17, 1882.

The act of July 5, 1884, making appropriations for the support of the army for the year ending June 30, 1885, provides: that hereafter any paymaster of the rank of major who has served twenty years in the United States Army as a commissioned officer may, upon his own application or by direction of the President, be placed upon the retired list of the army, until the pay department shall be reduced to thirty-five members, as follows: one paymaster-general, with the rank of brigadier-general; two assistant paymasters-general, with the rank of colonel; three deputy paymasters-general, with the rank of lieutenant-colonel, and twenty-nine paymasters, with the rank of major; and no more appointments of paymasters shall be made in the pay department until the number shall be reduced below twenty-nine majors, and thereafter the number of officers in the pay department shall not exceed thirty-five.

General Rochester was retired by operation of law February 15, 1890 (act of June 30, 1882), and on March 10, 1890, William Smith, lieutenant-colonel and deputy paymaster-general, was selected and appointed paymaster-general.

